SAMSUNG

LASER PRINTER

ML-1640/ML-2240

Model : ML-1645/XEV

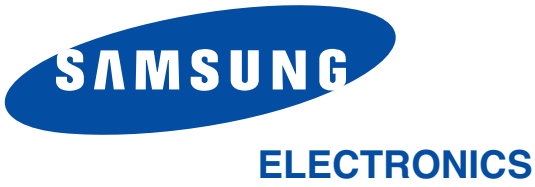
Basic Model : ML-1640

SERVICE Manual

LASER PRINTER

The keynote of Product

- Speed
  ML-1640 : 16 ppm (A4), 17 ppm(Ltr)
  ML-2240 : 22ppm (A4), 23 ppm (Ltr)
- Emulation : GDI
- Processor : 150 Mhz Jupiter4e CPU
- Memory : 8 MB
- Toner cartridge : Initial (0.7K), Sales (1.5K)
- MP tray : Only ML-2240
- Interface : Full Speed USB 2.0
- Machine life : 50K (pages)



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1. Precautions

The cautions below are items needed to keep in mind when maintaining and servicing.
Please read carefully and keep the contents in mind to prevent accidents while servicing and to prevent the machine from getting damaged.

1.1 Safety Warning

(1) Request service by qualified service person.
Service for this machine must be performed by a Qualified service person. It is dangerous if unqualified service personnel or users try to fix the machine.

(2) Do not rebuild.
Do not attach or change parts discretionary. Do not dissemble, fix of rebuilt it. If so, printer will abnormally work and electric shock or fire may occur.

(3) Laser Safety Statement
The Printer is certified in the U.S. to conform to the requirements of DHHS 21 CFR, chapter 1 Subchapter J for Class 1(1) laser products, and elsewhere, is certified as a Class I laser product conforming to the requirements of IEC 825.
Class I laser products are not considered to be hazardous. The laser system and printer are designed so there is never any human access to laser radiation above a Class I level during normal operation, user maintenance, or prescribed service condition.

Warning >> Never operate or service the printer with the protective cover removed from Laser/Scanner assembly. The reflected beam, although invisible, can damage your eyes. When using this product, these basic safety precautions should always be followed to reduce risk of fire, electric shock, and injury to persons.

CAUTION - INVISIBLE LASER RADIATION WHEN THIS COVER OPEN. DO NOT OPEN THIS COVER.

VORSICHT - UNSICHTBARE LASERSTRAHLUNG, WENN ABDECKUNG GEÖFFNET. NICHT DEM STRAHL AUSSETZEN.

ATTENTION - RAYONNEMENT LASER INVISIBLE EN CAS D'OUVERTURE. EXPOSITION DANGEREUSE AU FAISCEAU.

ATTENZIONE - RADIAZIONE LASER INVISIBILE IN CASO DI APERTURA. EVITARE L'ESPOSIZIONE AL FASCIO.

PRECAUCION - RADIACION LASER IVISIBLE CUANDO SE ABRE. EVITAR EXPONERSE AL RAYO.

ADVARSEL. - USYNLIG LASERSTRÅLNING VED ÅBNING, NÅR SIKKERHEDSBRYDERE ER UDE AF FUNKTION. UNDGÅ UDSAETTELSE FOR STRÅLNING.

ADVARSEL. - USYNLIG LASERSTRÅLNING NÅR DEKSEL ÅPNES. STIRR IKKE INN I STRÅLEN. UNNGÅ EKSPONERING FOR STRÅLEN.

VARNING - OSYNLIG LASERSTRÅLNING NÄR DENNA DEL ÄR ÖPPNAD OCH SPÄRREN ÄR URKOPPLAD. BETRAKTA EJ STRÅLEN. STRÅLEN ÄR FARLIG.

VARO! - AVATTAESSA JA SUOJALUKITUS OHITETTAESSA OLET ALTTIINA NÄKYMÄTTÖMÄLLE LASER-SÄTEILYLLE ÄLÄ KATSO SÄTEESEEN.

注 意 - 严禁渴开此盖, 以免激光泄露灼伤

주 의 - 이 덮개를 열면 레이저광에 노출될 수 있으므로 주의하십시오.

1.2 Safety Caution

1.2.1 Noxious Material Precaution

The toner in a printer cartridge contains a chemical material, which may harm human body if it is swallowed. Please keep children out of reach of the toner cartridge.

1.2.2 Electric Shock or fire Precaution

It is possible to get electric shock or burn by fire if you don't fallow the instructions of the manual.

(1) Use exact voltage. Please use an exact voltage and wall socket. If not, a fire or an electric leakage can be caused.
(2) Use authorized power cord. Do use the power cord supplied with PRINTER. A fire can happen when over current flows in the power cord.
(3) Do not insert many cords in an outlet. A fire can be occurred due to flow over current in an outlet.
(4) Do not put water or extraneous matter in the PRINTER. Please do not put water, other liquid, pin, clip, etc. It can cause a fire, electric shock, or malfunction. If this occurs, turn off the power and remove the power plug from outlet immediately.
(5) Do not touch the power plug with wet hand. When servicing, remove the power plug from outlet. Do not insert or take off it with wet hand. Electric shock can be occurr.
(6) Caution when inserting or taking off the power plug. The power plug has to be inserted completely. If not, a fire can be caused due to poor contact. When taking off the power plug, grip the plug and take it off. If grip the line and pull over, it could be damaged. A fire or electric shock could happen.
(7) Management of power cord. Do not bend, twist, or bind it and place other materials on it. Do not fix with staples. If the power cord gets damaged, a fire or electric shock can happen. A damaged power cord must be replaced immediately. Do not repair the damaged part and reuse it. A repaired part with plastic tape can be cause a fire or electric shock. Do not spread chemicals on the power cord. Do not spread insecticide on the power cord. A fire or electric shock can be happen due to thinner(weak) cover of the power cord.
(8) Check whether the power outlet and the power plug are damaged, pressed, chopped, or blazing fire or not. When such inferiorities are found, repair it immediately. Do not make it pressed or chopped when moving the machine.
(9) Caution when there is thundering or lightning, and being flash of lightening. It causes a fire or electric shock. Take the power plug off there is thunder. Do not touch cable and device when thundering and flash of lightening.
(10) Avoid the place where is moisture or has dust. Do not install the printer where lots of dust or around humidifier. A fire can occurred. A plug part need to clean well with dried fabric to remove dust. If water drops are dripped on the place covered with dust, a fire can occurred.
(11) Avoid direct sunlight. Do not install the printer near window where direct contacts to the sunlight. If the machine contacts sunlight long time, the machine cannot work properly because inner temperature of the machine is getting hotter. A fire can occur.
(12) Turn off the power and take off the plug when smoke, strange smell, or sound from the machine. If you keep using it, a fire can be occurred.
(13) Do not insert steel or metal piece inside/outside of the machine. Do not put steel or metal piece into a ventilator. An electric shock could happened.

1.2.3 Handling Precautions

If you ignore this information, you could harm machine and could be damaged.

(1) Do not install it on different levels, or slanted floor.
Please confirm whether it is balanced or not after installation. If it is unbalanced, an accident can be happened due to the machine falling over.
(2) Be careful not to insert a finger or hair in the rotating unit.
Be careful not to insert a finger of hair in the rotating unit (motor, fan, paper feeding part, etc) while the machine is operating. Once it happens, you could be harmed.
(3) Do not place a pot containing water/chemical or small metals. If they got caught into the inner side of machine, a fire or electric shock can be occurred.
(4) Do not install it where lots of moisture or dust exists or where raindrop reaches. A fire or electric shock can be caused.
(5) Do not place a candlelight, burning cigarette, and etc. on the machine. Do not install it near to heater. A fire can be occurred.

1.2.4 Assembly/Disassembly precaution

When replacing parts, do it very carefully. Memorize the location of each cable before replace parts for reconnecting it afterwards. Do memorize. Please perform the steps below before replace or disassembly the parts.

(1) Check the contents stored in the memory. All the information will be erased after replacing main board. The information needed to keep has to be written down.
(2) Before servicing or replacing electric parts, take off a plug.
(3) Take off printer cables and power cord connected to printer.
(4) Do use formal parts and same standardized goods when replacing parts.Must check the product name, part cord, rated voltage, rated current, operating temperature, etc.
(5) Do not give an over-force when release or tighten up the plastic parts.
(6) Be careful not to drop the small parts such as screws in the printer.
(7) Be careful not to change the location of small parts such as screws when assembling and disassembling.
(8) Do remove dust or foreign matters completely to prevent fire of tracking, short, or etc.
(9) After finished repair, check the assembling state whether it is same as before the repair or not.

1.3 ESD Precautions

Certain semiconductor devices can be easily damaged by static electricity. Such components are commonly called “Electrostatically Sensitive (ES) Devices”, or ESDs. Examples of typical ESDs are: integrated circuits, some field effect transistors, and semiconductor “chip” components.
The techniques outlined below should be followed to help reduce the incidence of component damage caused by static electricity.

Caution >>Be sure no power is applied to the chassis or circuit, and observe all other safety precautions.

1. Immediately before handling a semiconductor component or semiconductor-equipped assembly, drain off any electrostatic charge on your body by touching a known earth ground. Alternatively, employ a commercially available wrist strap device, which should be removed for your personal safety reasons prior to applying power to the unit under test.
2. After removing an electrical assembly equipped with ESDs, place the assembly on a conductive surface, such as aluminum or copper foil, or conductive foam, to prevent electrostatic charge buildup in the vicinity of the assembly.
3. Use only a grounded tip soldering iron to solder or desolder ESDs.
4. Use only an “anti-static” solder removal device. Some solder removal devices not classified as “anti-static” can generate electrical charges sufficient to damage ESDs.
5. Do not use Freon-propelled chemicals. When sprayed, these can generate electrical charges sufficient to damage ESDs.
6. Do not remove a replacement ESD from its protective packaging until immediately before installing it. Most replacement ESDs are packaged with all leads shorted together by conductive foam, aluminum foil, or a comparable conductive material.
7. Immediately before removing the protective shorting material from the leads of a replacement ESD, touch the protective material to the chassis or circuit assembly into which the device will be installed.
8. Maintain continuous electrical contact between the ESD and the assembly into which it will be installed, until completely plugged or soldered into the circuit.
9. Minimize bodily motions when handling unpackaged replacement ESDs. Normal motions, such as the brushing together of clothing fabric and lifting one’s foot from a carpeted floor, can generate static electricity sufficient to damage an ESD.

2. Product specification and feature

2.1 Product Specifications

2.1.1 Product Overview

Item	Descriptions
Model name	ML-1640/ML-2240
Marketing target	Personal use
Main Specification	* speed ML-1640 : 17 ppm (Ltr) / 16 ppm (A4) ML-2240 : 23 ppm (Ltr) / 22 ppm (A4), * 150MHz Jupiter4e CPU/ 8M memory * Toner Cartridge : Initial (0.7K), Sales (1.5K) * Machine Life : 50K

2.1.2 Specifications

- Product Specifications are subject to change without notice. See below for product specifications.

2.1.2.1 General Specifications

Item		ML-1640	ML-2240
Major Features		Print	Print
Size (W*D*H)		353mmx298mmx213mm (13.9"x11.7"x8.4")	353mmx298mmx213mm (13.9"x11.7"x8.4")
Net Weight (Inc. Toner Cartridge)		5.7kg	5.9kg
Net Weight (exc. Toner Cartridge)		4.95kg	5.05kg
Gross Weight (with package)		7.1Kg	7.5Kg
LCD		N/A (one button, 2 LED)	N/A (one button, 2 LED)
I/O Interface		USB2.0 Full-Speed	USB2.0 Full-Speed
MPU		Jupiter4e / 150MHz	Jupiter4e / 150MHz
Power Consumption	Printing Operation	300W	350W
	Sleep Mode	6 Wh Energy Star Compliant	6Wh Energy Star Compliant
	Power Switch	Yes	Yes
Power Supply	Input Voltage	Low Voltage : 110 ~ 127VAC	Low Voltage : 110 ~ 127VAC
		High Voltage : 220 ~ 240VAC	High Voltage : 220 ~ 240VAC
	Input Frequency	50 / 60Hz(+/- 3Hz)	50 / 60Hz(+/- 3Hz)
Noise	Printing	50dBA	51dBA
	Standby	26dBA	32dBA
Max. Monthly Volume (Duty Cycle)	Print	5000pages	10,000pages

Item		ML-1640	ML-2240
Average Monthly Print Volume		140pages	170pages
Machine Life		50,000pages	50,000pages
Temperature	Operating	10~32 ℃	10~32 ℃
	Non Operating	-20~40 ℃	-20~40 ℃
Humidity	Operating	20~80%	20~80%
	Non Operating	10~90%	10~90%
Altitude		Max 8,200ft	Max 8,200ft

2.1.2.2 Print Engine

Item		ML-1640	ML-2240
Print Speed		17ppm/Ltr, 16ppm/A4 (600 dpi)	23ppm/Ltr, 22ppm/A4 (600 dpi)
Print Emulation		GDI,	GDI,
Auto Emulation Sensing		YES	YES
Font	Type	N/A	N/A
	Number	N/A	N/A
Power Save		Yes(5/10/15/20/30/45/60/120min.)	Yes(5/10/15/20/30/45/60/120min.)
Resolution		600x600dpi	600x600dpi
Toner Save		Yes (No dedicated button on CP)	Yes (No dedicated button on CP)
FPOT	From Stand by	Approx. 10 seconds (From LSU 'ON', A4)	Approx. 10 seconds (From LSU 'ON', A4)
	From Sleep mode	Less than 40 seconds	Less than 19 seconds
Duplex Print		N.A	N.A
Printable Area		208 x 273 mm (Letter)	208 x 273 mm (Letter)
Halftone(Gray Scale)		128levels	128levels
Memory	Standard / Max.	8MB/8MB(Std./Max)	8MB/8MB(Std./Max)
	Type	SDRAM	SDRAM
	Expand Memory Slot	N/A	N/A

2.1.2.3 Paper Handling

Item		ML-1640	ML-2240
Capacity(20 lbs)	Main Tray	150sheets	150sheets
	Bypass	N/A	N/A
Optional Cassette		N/A	N/A
Output Capacity		Face Down: 50Sheets/20lb	Face Down: 100Sheets/20lb
Output Control		Face down	Face down
Paper Size	Auto Feeding	A4, Letter, Legal, Oficio, Folio, Executive, JIS B5, ISO B5, A5, A6, Envelop 10 DL C5 C6 73/4	A4, Letter, Legal, Oficio, Folio, Executive, JIS B5, ISO B5, A5, A6, Envelop 10 DL C5 C6 73/4
Paper Weight	Auto Feeding	16~24 lb.	16~24 lb.
	Manual Feeding	24~43 lb.	24~43 lb.
Paper Path	Standard output	Bottom to Upper Front (FIFO)	Bottom to Upper Front (FIFO)
	Straight Through	N/A	N/A
Paper Size	Max	216 x 356mm(8.5"x14")	216 x 356mm(8.5"x14")
	Min	76 x 127mm(3"x5")	76 x 127mm(3"x5")
Printing Skew	Top	2.5/177.8mm	2.5/177.8mm
	Side	3.5/241.3mm	3.5/241.3mm

2.1.2.4 Software

Item		ML-1640	ML-2240
Compatibility	DOS	No	No
	Win 3.x	No	No
	Win 95	Yes (except Status Monitor)	Yes (except Status Monitor)
	Win 98	Yes	Yes
	Win ME	Yes	Yes
	Win NT 4.0	Yes	Yes
	Win 2000	Yes	Yes
	Win XP	Yes	Yes
	Mac	No	Yes
	Linux	No	Yes
WHQL	Printer	Yes for 2000 & XP	Yes for 2000 & XP
Driver	Printer	GDI	GDI
	TWAIN	No	No
	WIA	No	No
	RCP	No	None

2.1.2.5 Consumables

Item		ML-1640	ML-2240
FRU	Pickup Roller	50 K	50 K
	Pad Unit	50 K	50 K
	Transfer Roller	50 K	50 K
	Fuser Unit	50 K	50 K
CRU	Toner Life	Initial : 0.7K pages Sales : 1.5K pages (ISO / IEC 19752 Standard pattern)	Initial : 0.7K pages Sales : 1.5K pages (ISO / IEC 19752 Standard pattern)

2.1.3 Model Comparison Table

	ML-1640	ML-2240	Remark
CPU	Jupiter 4e	Jupiter 4e	same
Code	Legacy	Platform	
PPM	A4 : 16ppm / Letter : 17ppm	A4 : 22ppm / Letter : 23ppm	
Memory	8MB	8MB	
Dev. Fuse	No. (New Drum Detection : By CRUM)	No. (New Drum Detection : By CRUM)	same
Resolution	300 / 600dpi	600 / 1200dpi	
SPL Driver	Unified UI	Unified UI	
Manual Duplex	No.	Yes.	
Fan	No.	Yes.	
Mech		Manual Feeder Guide : Yes	

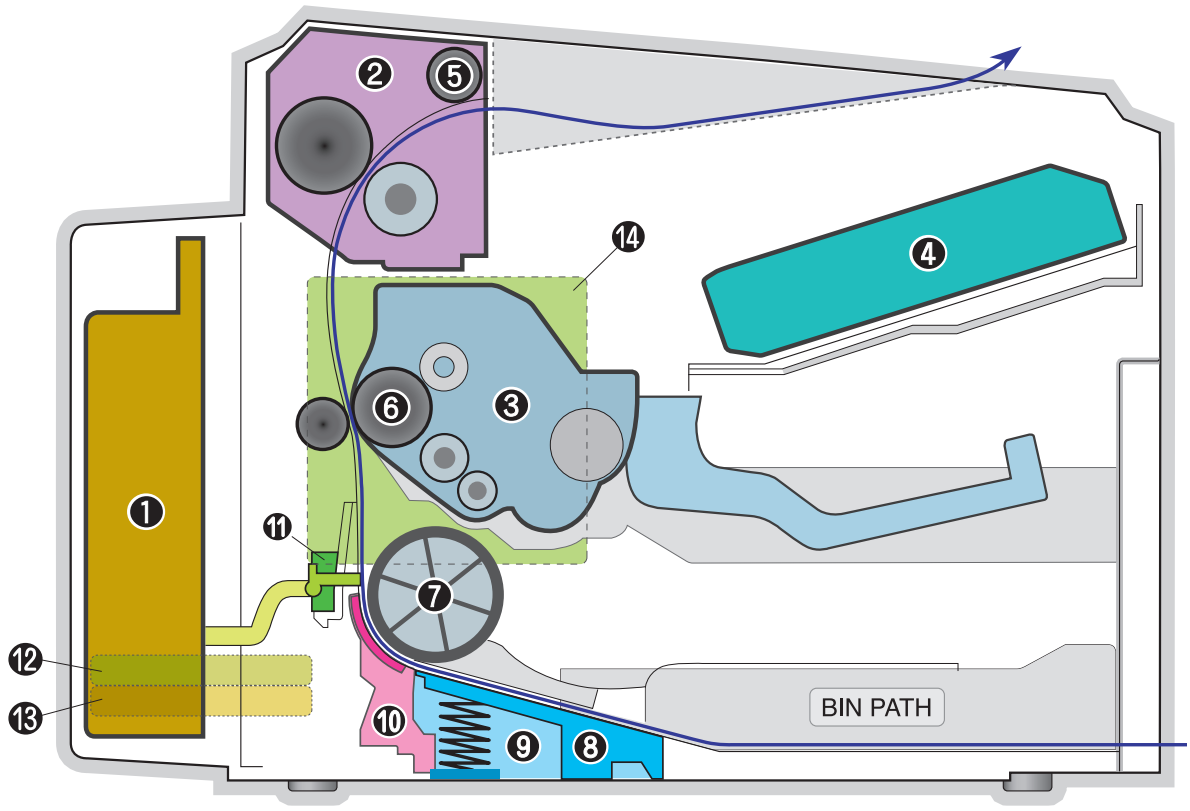
2.1.4 Accessory List

Item	ML-1640	ML-2240
INA-ACCESSORY	JC99-02162C	JC99-02161C
CBF-POWER CORD	3903-000042	3903-000042
BAG PE	6902-000809	6902-000809
S/W APPLICATION-CD	JC46-00403A	JC46-00402A
MANUAL-(CARD)WARRANTY CARD	JC68-00690A	JC68-00690A
LABEL(P)-BLANK 90*25	JC68-01584A	JC68-01584A
COVER-PAPER		JC63-01891A

2.2 System Overview

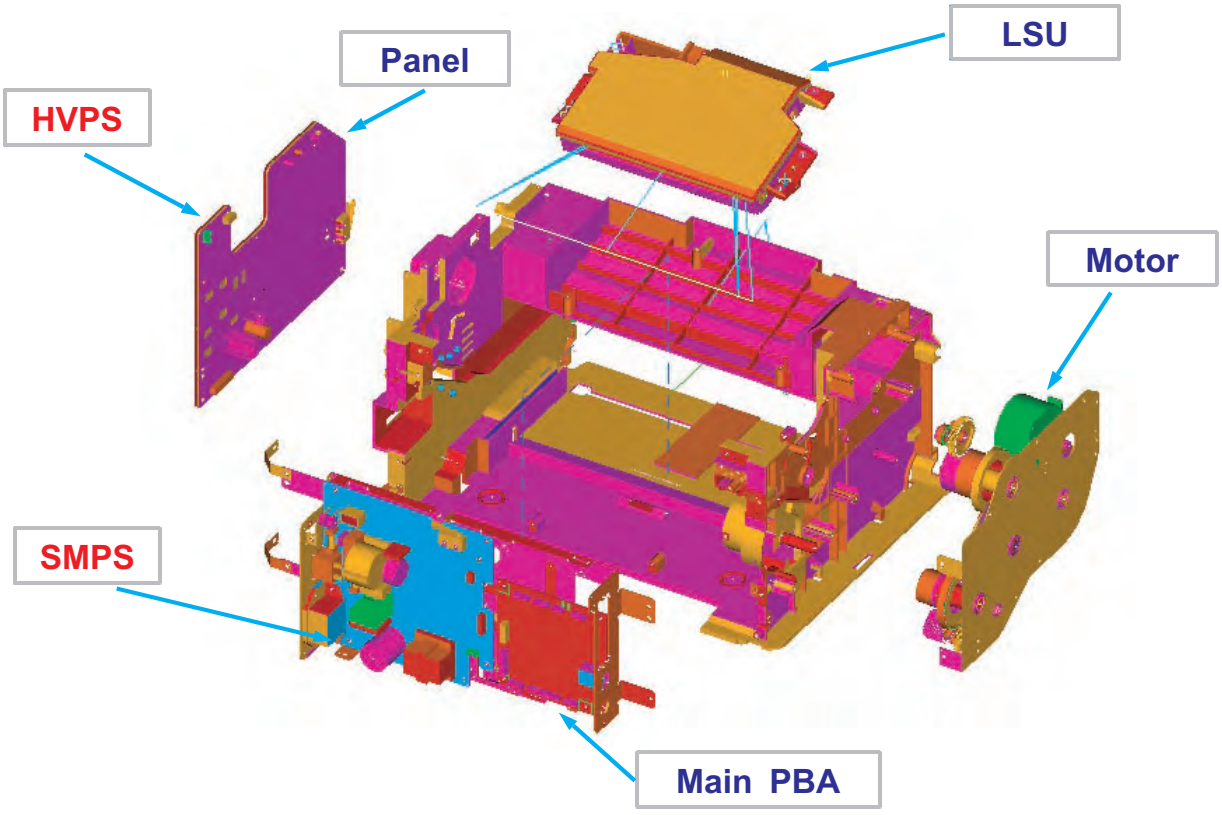
2.2.1 System Outline

▣ Paper Path Layout



❶ SMPS	❷ Fuser
❸ Toner Cartridge	❹ LSU
❺ Exit Roller	❻ OPC
❼ Pick-Up Roller	❽ KNOCK-UP PLATE
❾ KNOCK-UP PLATE DOWN	❿ ASS'Y HOLDER PAD
⓫ Feed Sensor	⓬ MAIN PBA
⓭ SMPS	⓮ HVPS

▣ Unit Layout



2.2.1.1 Feeding

There are the C-path type, which loads papers, and the manual feeder, which supplies paper one by one.The cassette has the function pad which separates paper one by one, and it has the sensor function to check the existence of the loading paper.

1) Feeding Type : MPF Type
2) Feeding Standard : Center Loading
3) Feeding Qty : Cassette 150 sheets (75g/㎡, 20lb paper standard)
4) Manual 1 sheet (Paper, OHP, Envelope etc.)
5) Separating Type : Cassette - Friction Pad Type
6) Driver Type : Driving by Gearing from Main Motor
7) Pick_up Roller Driver : Solenoid
8) Paper detecting Sensor : Photo Sensor
9) Paper Size Sensor : None
10) Paper Exit Type : Face Down
11) MP Tray : MP Cassette Type (Cener Loading)

2.2.1.2 Transfer Ass'y

The transfer roller delivers the toner of the OPC drum to the paper.

- The life span : Print over 50,000 sheets (in 16 ~30 ℃)

2.2.1.3 Driver Ass'y

It is a power delivery unit by gearing. By driving the motor, it supplies the power to the feeding unit, the fusing unit, and the distributing unit.(Motor drive IC : A3977)

- It is a power delivery unit by gearing : Feeder/Developer ← Motor → Fuser/Exit

2.2.1.4 FUSER

The fuser is consisted of the Heat Lamp,Heat Roller,Pressure Roller,Thermister and Thermostat.
It adheres the toner on the paper with pressure and heat to complete the printing job.

- Life Cycle : 50K(pages)

1) Heat Lamp
. Heat Lamp Terminal Shape : Terminal Single Type
. Voltage 120 V : 115 +/- 5 %
220 V : 230 +/- 5 %
. Capacity : 600 Watt (ML-1640), 750 Watt (ML-2240) +/- 5 %
. Life : 3000 Hr

2) Thermostat
. Thermostat Type : Non-Contact type THERMOSTAT
. Control Temperature : 150℃ ± 5℃

3) Thermistor
. Thermistor Type : HF-K7006
. Temperature Resistance : 7㏀ (180℃)
. SYSTEM Temperature SETTING
- Stand by : 155 / 145 / 140℃ +/- 5 ℃ (~30page / 31 ~ 60page / 60page~) (NN. Plain)
- Printing : 175 / 170 ℃ +/- 5 ℃ (~30page / 30page ~) (NN. Plain)
- Overshoot : 200℃ or less
- Overheat : 220℃ or less

4) Heat roller
. Length : 247.5 mm
. Valid length : 222 mm
. GND Type : H/R Bearing Grounding type By SECC Fuser frame

5) Pressure roller
. Shaft
- Length : 237.5 mm
. Rubber
- Length : 222 mm

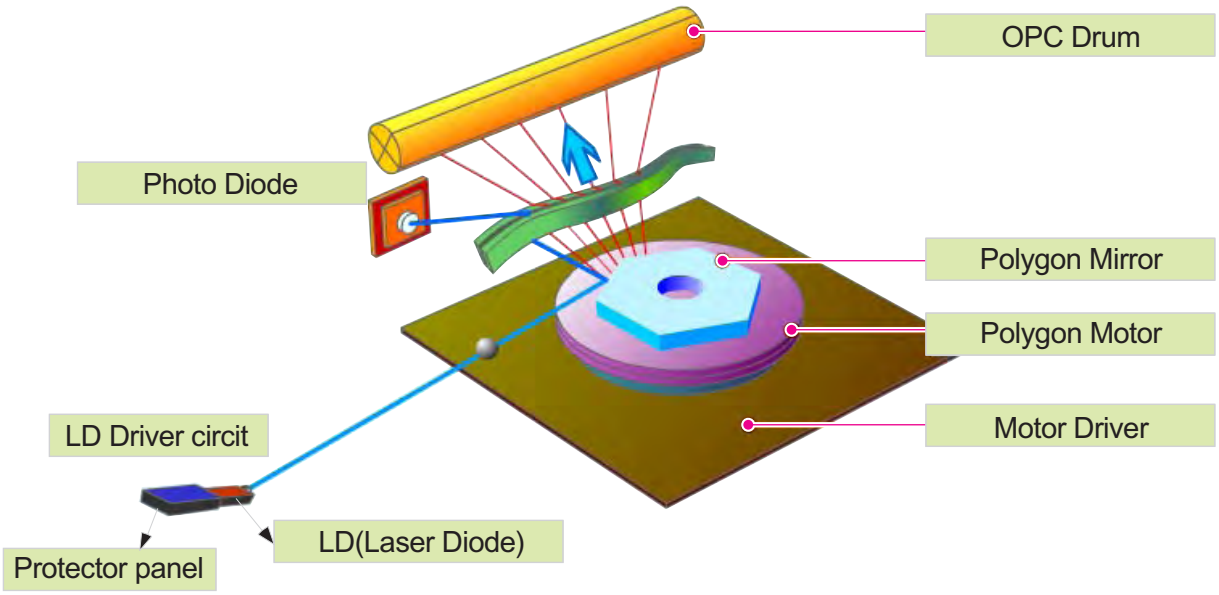
6) Paper separation method
Teflon sintered Claw System

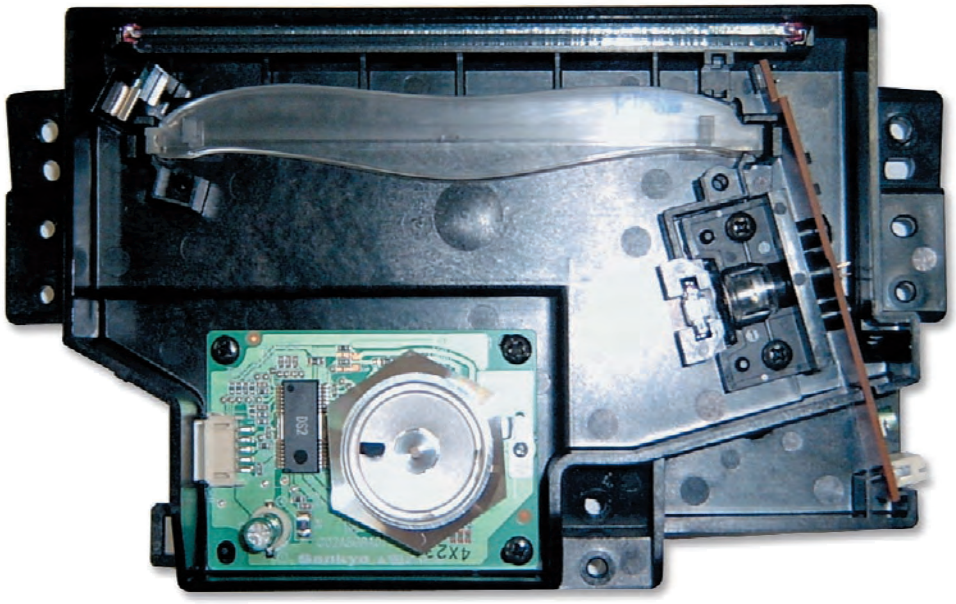
7) Safety Relevant Facts
. Protecting device when overheating
- 1st protecting device : H/W cuts off when detecting an overheating
- 2st protecting device : S/W cuts off when detecting overheating
- 3st protecting device : Thermostat cuts off the power
. Safety device
- The power of Fuser is cut-off after front cover is open.
- The overheating safety device for customer
- The surface temperature of the Fuser Cover is under 80℃

2.2.1.5 LSU (Laser Scanner Unit)

The LSU unit is controlled by video controller. It scans the video data received from video controller with laser beam by using the rotation principle of the polygon mirror to create the latent image on the OPC drum. It is the core part of LBP.

The OPC drum rotates as the same speed as the paper feeding speed. It creates the /HSYNC signal and sends it to the engine when the laser beam of the LSU reaches the end of the polygon mirror, and the engine detects the /HSYNC signal to arrange the vertical line of the image on the paper. After detecting the /HSYNC signal, the image data is sent to the LSU to arrange the its margin on the paper. The one side of the polygon mirror is one line for scanning..

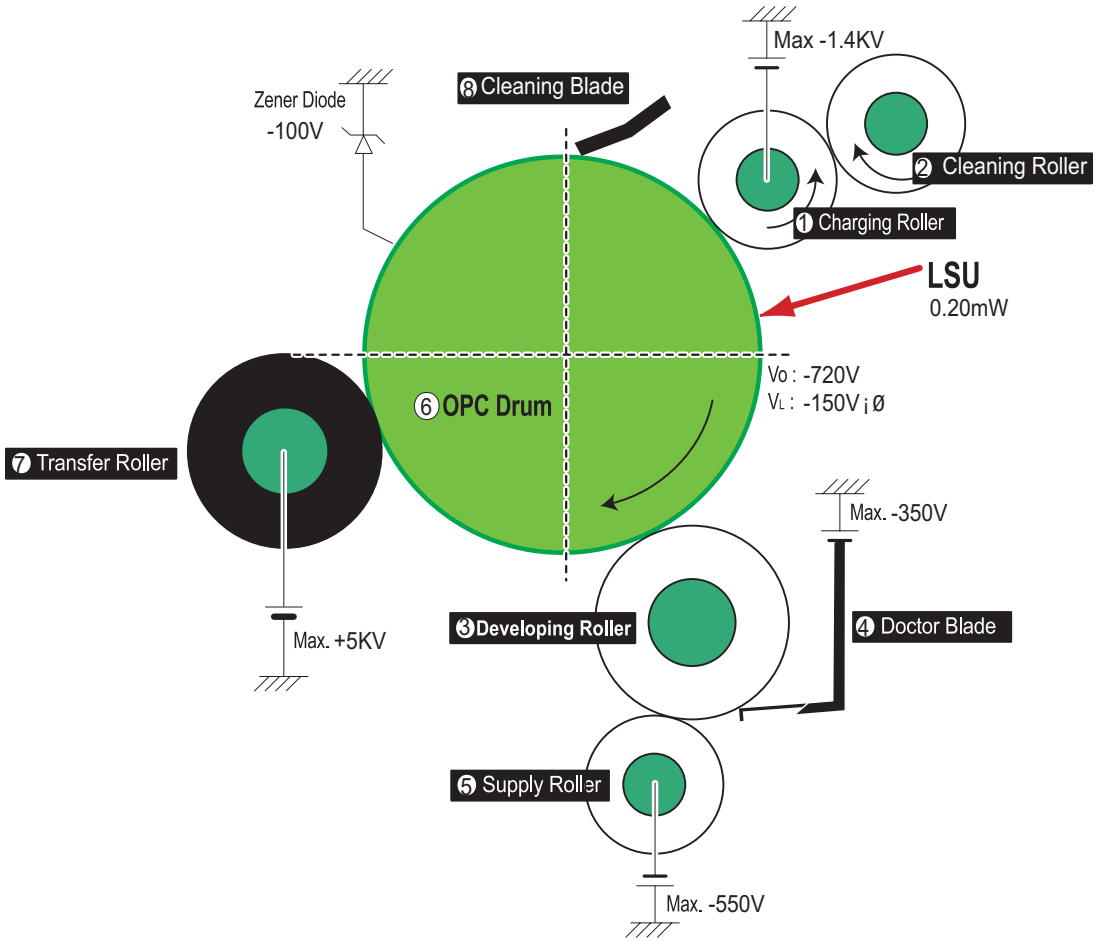




2.2.1.6 Toner Cartridge

By using the electronic photo process, it creates a visual image. In the toner cartridge, the OPC unit and the developer unit are in a body. The OPC unit has OPC drum and charging roller, and the developer unit has toner, toner cartridge, supply roller, developing roller, and blade (Doctor blade)

- Developing Method: Non magnetic 1 element contacting method
- Toner: Non magnetic 1 element shatter type toner
- The life span of toner: Initial (700 sheets) / Sales (1500 sheets) (ISO 19752 Pattern/A4 standard)
- Toner remaining amount detecting sensor: None
- OPC Cleaning: Collect the toner by using Cleaning Blade
- Management of disusable toner: Collect the toner by waste bottle
- OPC Drum protecting Shutter: None
- Classifying device for toner cartridge: ID is classified by CRUM (Toner sales)



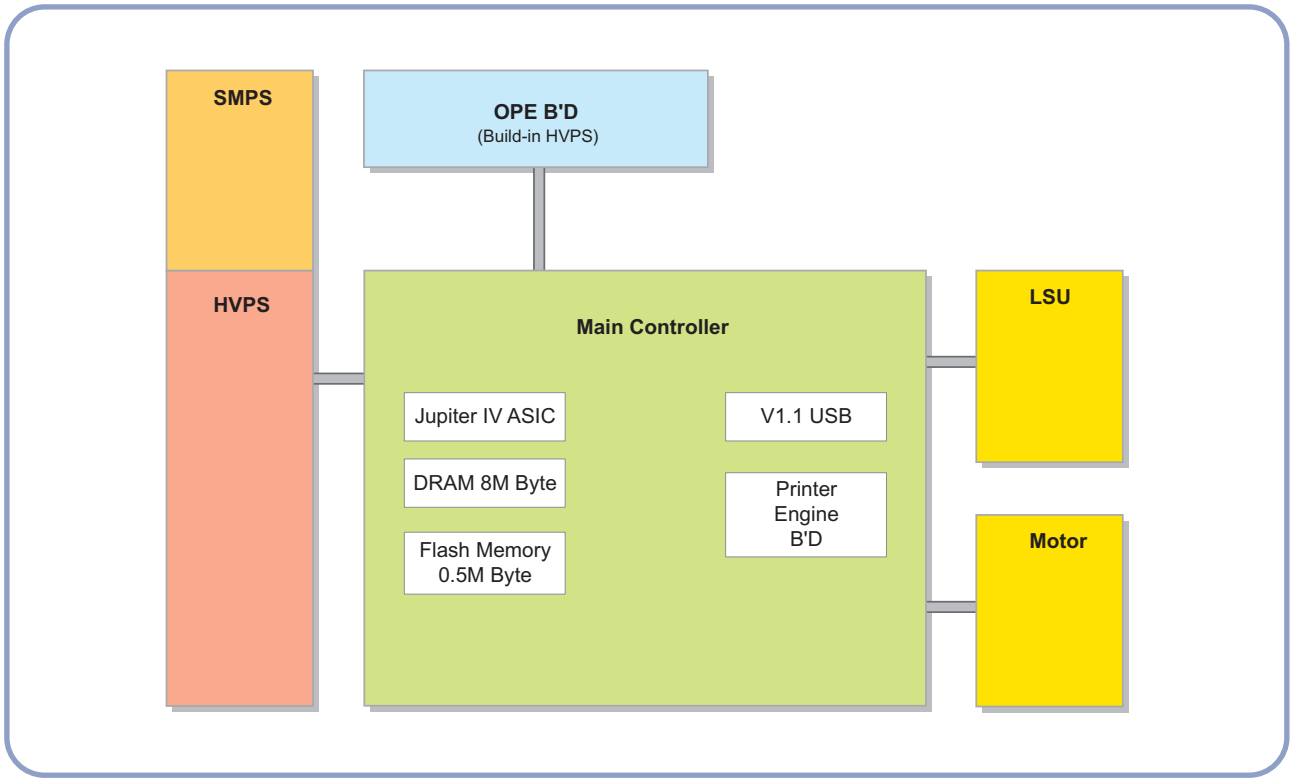
2.2.2 H/W Structure and Descriptions

2.2.2.1 H/W Overview

ML-1640/2240 is roughly made up Main Control part and SMPS/HVPS part.

Main Controller uses Jupiter4E for its ASIC, which is on chip micro controller and developed for Low-end Laser Beam Printer.

Jupter4E provides the integrated printing functions such as Printer video controller, Laser Scan Unit controller, PWM controller and Bi-polar Stepper Motor Controller and has USB interface and built-in Flash memory with 4Mbits capacity.



2.2.2.1(a) Main Control

ML-1640/2240 of Main Control are composed of CPU and Print and operate follows function by CPU

- Bus Control, I/o
- Handling, each Driver and PC Interface

Main Control operate its full function on the Main B'd and CPU control Controller ASIC and build-in Memory.

2.2.2.1(b) CPU

Use 32Bit RISC Processor of Jupiter4e, and control system by operating Operation Block of the System Program inside Flash Memory.

- Main Function Block: · Completely Integrated System for Embedded Applications,
  · 32 Bit Risc Architecture, Efficient and Powerful ARM9 CPU
  · LSU Interface Module for Interfacing PVC with LSU
  · 2 Channel General Purpose DMA Controller for High Speed I/O
  · Dual Memory Bus Architecture
- Operation Frequency : 150MHz
- Operation Voltage : 3.3V
- POWER ON RESET TIME : 6.6ms below

2.2.2.1(c) Flash Memory

Store System Program and can be down load System Program through PC Interface

- Capacity : 0.5M Byte
- Access Time : 70 nsec

2.2.2.1(d) DRAM

When Printing, use Band Buffer, System Working Memory Area .

- 8M capa : 8M Byte basic.
- Access Time : 60 nsec

2.2.2.1(e) ENGINE

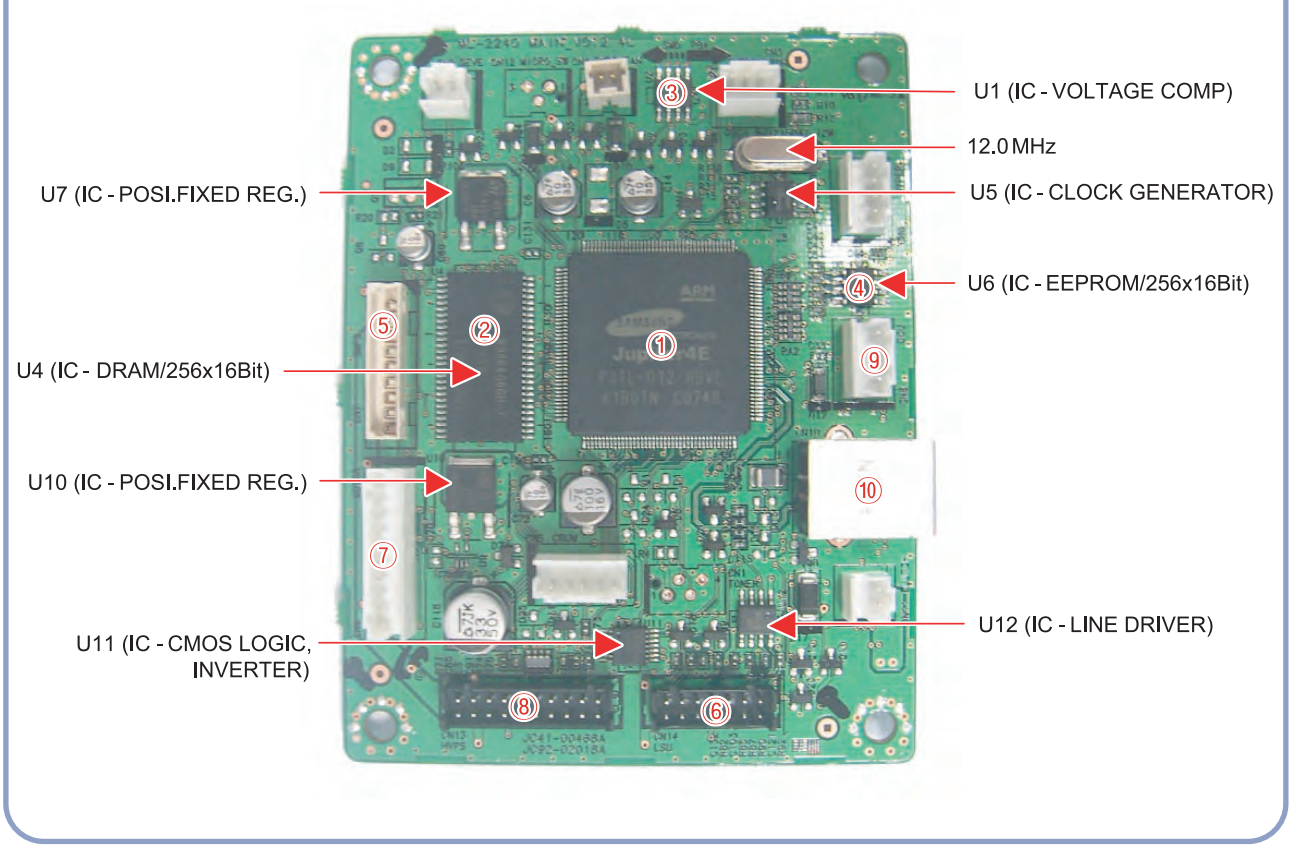
This recording method is electrophography method using LSU, which toner is composed of 1 component and non magnetic.

1) Recording Method : LSU(Laser Scanning Unit)
2) Printing Speed : 22ppm
   (In continuing printing base A4, printing pages from 2nd to last during 1min)
3) Recording Density : 600 dpi ×1200 dpi
4) Cassette Capa. : Cassette ; 150sheets(75g ㎡ Base),
   Manual : 1 sheet (Paper, OHP, Envelop, etc)
5) Paper Size : Cassette ,Manual; Width = 76 ~ 216mm, Length = 125mm ~ 356mm
6) Effective recording size
   - A4 : 202 x 291 mm
   - Letter : 208 x 273 mm
   - Legal : 208 x 350 mm
   - Folio : 208 x 325 mm
   - Top Margin : 4.23 ± 3 mm
   - Left, Right Margin : 4.23 ± 3 mm
7) CRU(Toner Cartridge)Life : 1,500pages Printing(A4, 5% Pattern Printing)
8) First Print Out Time : 10sec(Standby)

2.2.2.2 Main Board

Main Board are composed of Engine and Controller on the one-Board.

Main Board control to send Current Imagedml Video Data to LSU to print and have motor Driving and Circuit for the current driving and also include Paper Exit Sensor, Cover Open s/w, panel s/w.



① U6(Jupiter 4E)
- It is a main CPU and an Asic of Jupiter4E which has a CPU core CLK with over 150MHz and a System bus 75MHz.
- It use 3.3V for operation voltage and I/O, It uses 75MHz for system bus CLK, Built in Flash Memory.

② SDRAM
- Main memory. SDCLK is 75Mhz.

③ Regulator
- It Supplies the core voltage to CPU by converting 3.3V to 1.8V.

④ EEPROM(U8 : 93C66)
- It is an EEPROM with 12C method.

⑤ SMPS connector(CN7)
- It connects SMPS, supplies the power, and delivers the high voltage contol signal, etc. If a harness is not normally connected to this connector, power cannot be supplied.

⑥ LSU connector(CN14)
- It connects a LSU.

⑦ BLDC Motor connector(CN9)
- It connects an main motor and drive a BLDC Motor.

⑧ HVPS connector(CN13)
- It connects a HVPS.

⑨ DCU connector(CN8)
- It interface a DCU-JIG.

⑩ USB connector(CN10)
- It interface a the printer.

2.2.2.3 Asic(SPGPm) Specification

2.2.2.3(a) Introduction

Jupiter4E is One-Chip micro-Controller for Low cust Laser beam Printer.

1. One Chip Laser Beam Printer Controller

- GDI only
- AMBA AHB used for high speed bus transactions between masters and slaves
- AMBA APB used for low speed bus transactions between ARM core and peripherals
- 3 PLLs (2 Dithered PLL and 1 General PLL)
  - first for CPU(150MHz), AHB(75MHz), APB(75MHz),
  - second for USB(48MHz)
  - third for PVC(59MHz)
- 75MHz system operation
- 1.8V power operation
- 3.3V tolerant input and bi-directional I/Os
- SDRAM and IO Address / Data signals multiplexing

2. Integrated ARM940T 32-bit RISC embedded processor core

- 150MHz core frequency operation
- Harvard Architecture Cache : 4KByte Instruction cache, 4KByte Data cache
- Single memory bus architecture

3. Built in Flash Memory

- 4MBits (128Kx32bits)
- Serial programming mode using flash programmer tool
- Internally flash memory read / write operation support
- Programmable access timing control

4. 32MB Special function Register Area

5. Directly connected to 3 external IO banks (IOC)

- 32 MB size in each IO bank
- Programmable setup, access, hold timing
- Programmable recovery time for slow devices
- Allows to access peripheral devices such as GPIO control logic

6. Directly connected to 1 external ROM bank (ROMC)

- 32 MB size for one ROM bank
- One external flash memory attachable.

7. Directly connected to two SDRAM banks (SDRAMC)

- Extensible architecture
- Two external SDRAM attachable.
- SDRAM controller supports PC-100 and PC-133 SDRAM running at 75MHz
- Up to 32MB per bank.
- Support for SDRAM configurations including programmable column address
- Programmable refresh interval

8. Interrupt Controller (INTC)

- FIQ or IRQ mode operation selectable
- Programmable Interrupt Enable/Disable

9. USB interface

- Version 1.1
- Four 128x8 FIFOs for Data transmission.
- Interrupt based input / output interface, no DMA based interface support
- USB wrapper for AHB interface
- AHB Bus interface

10. Serial port interface (UART)

- Programmable Baud Rate
- 2 channel Independent Full Duplex UART
- Polling, Interrupt based operation support
- Max 16 byte FIFO to handle SIR Bit Rate Speed

11. Printer video controller for LBP engines (PVC)

- 80MHz video rate (Hummingbird 2 : letter - 21 ppm, A4 : 20ppm)
- video data transmitted through LSU Controller

12. Laser Scan Unit (LSU) Controller

- Laser Scan Unit (LSU) Interface for Laser Diode turn on/off timing control
- Sample & hold period generation.
- Auto Power Control for Laser Diode with PID control method using internal 10 bits DAC.
- LSU clock generation
- Brushless DC motor control clock generation

13. ADC Interface

- 4 channels ADC interface for analog devices such as temperature sensor.
- Programmable ADC Clock Cycle.
- Automatic or Manual AD Conversion support.
- 4 Special Function Registers for monitoring the ADC results for 4 channels.

14. PWM Controller

- 4 PWM output ports - THV, BIAS, FAN control and AC ELECTRIFICATION

15. Bi-polar Stepper Motor controller (MOTORC)

- Phase generation for the purpose of paper feeding
- fixed hardware phase and current table
- programmable phase and interval time
- Interrupt based phase change operation

16. Timer

- 3 Independent Programmable Timers
- Watch Dog Timer for S/W Trap

17. Miscellaneous

- Mux controlled 24 GPI, 28 GPO & 5 GPIO ports .
- Mutual exclusive GPO/GPIO ports control by the port control enable register
- Programmable Bus Master Priority.
- Project code added.

2.2.2.4 Sensor Controller

2.2.2.4(a) Paper Feeding/Width

When a paper passes an actuator of a feed sensor unit after feeding a paper into a set,it detects a signal of the photo interrupter and informs the paper feeding status to CPU. After sensing the signal and certain time later, it strews an image data.(Related in Paper Front Edge Adjustment)

If it could not detect the feed sensor within 1 second after feeding a paper, a paper jam0 (CPU#_) occurs.

2.2.2.4(b) Paper Empty Sensing

The paper empty is detected by the empty sensor mounted to an engine board and the actuator mounted to a frame. Paper senses the on/off time of the empty sensor by using CPU and informs the normal operation status and the jam occurrence status to CPU.

2.2.2.4(c) Jam Cover/Cover Open Sensing

ML-1640/2240 uses two M/S:one senses the cover open and the other senses the jam cover open.

The cover open sensor is located on the left bottom of HVPS.When the front cover is open, +24V supplied to each unit (DC fan, Solenoid, Main Motor, Polygon Motor Unit of LSU in Fusing Unit, and HVPS) is interrupted.

The jam cover open sensor is located on the centeral top of HVPS. When the jam cover is open, +24V supplied to each unit (DC fan, Solenoid, Main Motor, Polygon Motor Unit of LSU in Fusing Unit, and HVPS) is interrupted.

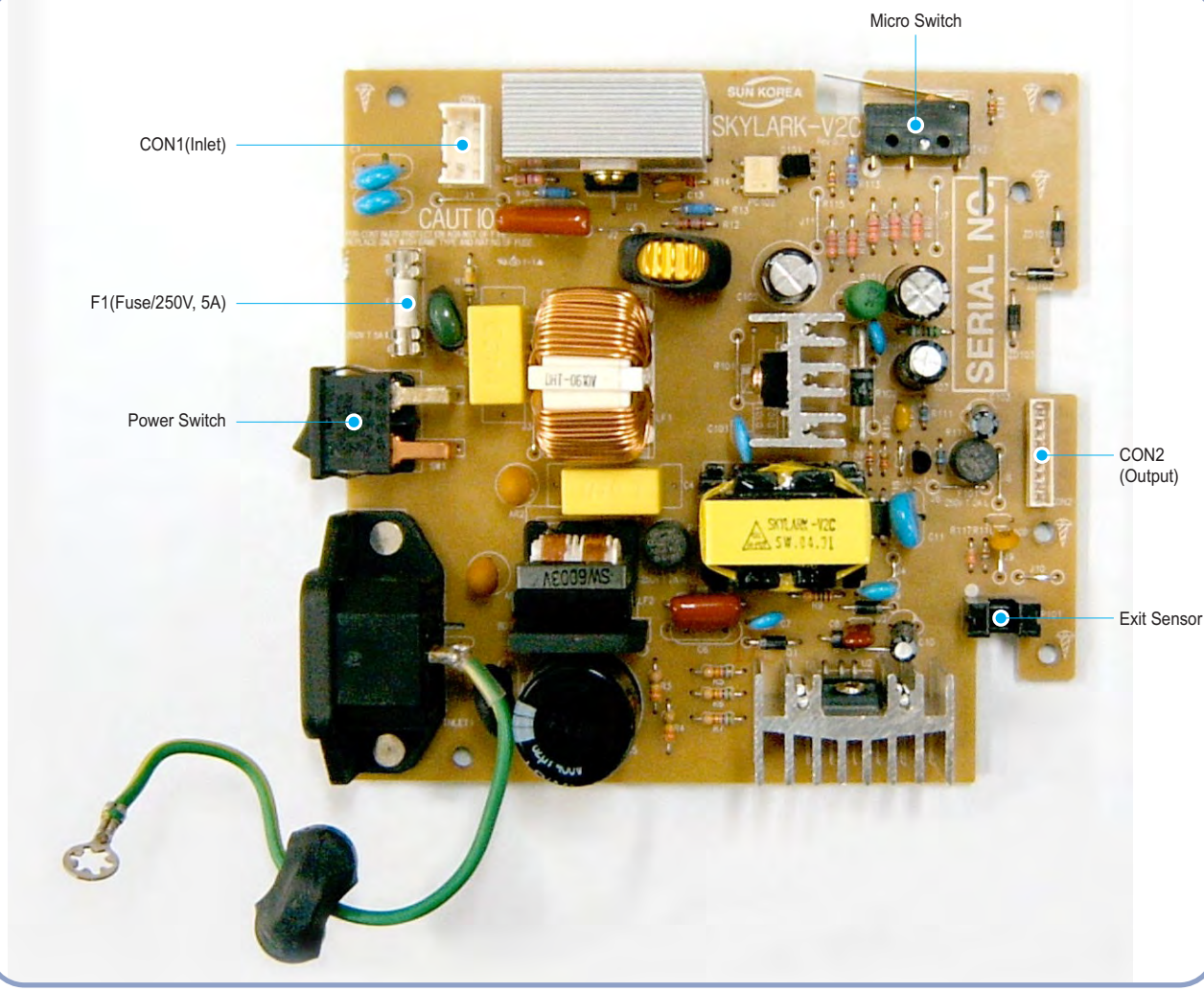
D0 bit of CPU detects the jam cover open/cover open, and D7 bit of CPU detects the existence of OPC. In this case, it informs the status to user by turning on the red LED among OP panel LEDs.

2.2.2.4(d) Solenoid Driving Circuit

The solenoid consists of two used for paper pick-up and MP signal. D4 bit of CPU turns it on/off, and its driving time is 300ms. The diode protects the drive TR from the pulse (noise)generated by de-energizing operation of solenoid.

2.2.2.5 SMPS board (Switching Module Power Supply)

The SMPS supplies DC Power to the System.
It takes 110V/220V and outputs the +5V, +24V to supply the power to the main board and other board. It is consisted of the AMPS part, which supplies the DC power for driving the system, and the AC heater control part, which supplies the power to fuser. SMPS has two output channels. Which are 5V and +24V



▣ Pin Signal

<CON2>

Pin No	Pin Name
1	+24VS2
2	+24V
3	+24VS1
4	+24VS1
5	+5V
6	DGND
7	DGND
8	P_REGI
9	FUSER ON

1) SMPS Specification

- AC Input

① Input Rated Voltage : AC 220V ~ 240V, AC 120V / AC 220V(110V version)

② Input Voltage fluctuating range : AC 90V ~ 135V / AC 180V ~ 270V(220V version)

③ Rated Frequency : 50/60 Hz

④ Frequency Fluctuating range : 47 ~ 63 Hz

⑤ Input Current : Under 4.0Arms / 2.5Arms

(But, the status when lamp is off or rated voltage is inputted/outputted)

- Rated Output Power

No	Items	CH1	CH2	Remarks
1	Channel	+5V	+24.0V	
2	Connector pin	CON 3 5V PIN : 11, 12 GND PIN : 8, 9	CON 3 24V PIN : 2, 3, 4 GND PIN : 6, 7	
3	Rated Output	+5V ± 5% (4.75 ~ 5.25V)	+24V ± 15% (20.4 ~ 27.6V)	
4	Max. Output current	0.8A	2.0A	
5	Peak Loading current	1.0A	2.5A	1ms
6	RIPPLE NOISE Voltage	100mVp-p or less	500mVp-p or less	
7	Maximum output	4W	24W	
8	Peak output	5W	48W	1ms
9	Protecttion for loading shorage and overflowing current			

- Consumption Power

No	Items	CH1(+5V)	CH2(+24V)	System
1	Stand-by	1.0 A	0.4 A	AVG : 55 Wh
2	PRINTING	1.0 A	2.0 A	AVG : 250 Wh
3	Sleep-Mode	0.8 A	0.4 A	AVG : 10 Wh

- Power Cord Length : 1830° ± 50mm
- Power Cord Switch : Use
- Feature

. Insulating Resistance : 100㏁ or more (at DC 500V)

. Insulating revisiting pressure : Must be no problem within 1 min. (at 1000Vac,10mA)

. Leaking Current : under 3.5mA

. Running Current : under 40A PEAK (AT 25℃, COLD START)
under 50A PEAK (In other conditions)

. Rising Time : within 2Sec

. Falling Time : over 20ms

. Surge : Ring Wave 6KV-500A (Normal, Common)

- Environment Condition
  - . Operating temperature range : 0℃ ~ 40℃
  - . Maintaining temperature range : -20℃ ~ 40℃
  - . Preserving Humidity Condition : 10% ~ 90% RH
  - . Operating atmospheric pressure range : 1atm

- EMI Requirement : CISPR ,FCC, CE, MIC,
- Safty Requrement : IEC950 UL1950, CSA950, C-UL,Semko, EK,CB, CCC(CCIB),GOST, EPA, Power Save

2.2.2.6 HVPS board (High Voltage Power Supply)

The HVPS board creates the high voltage of THV/MHV/Supply/Dev and supplies it to the developer part for making best condition to display the image. The HVPS part takes the 24V and outputs the high voltage for THV/MHV/BIAS, and the outputted high voltage is supplied to the toner, OPC cartridge, and transfer roller.

1) Transfer High Voltage (THV+)

- Input Voltage : 24 V DC ° ± 15%
- Out Voltage : Max. +1.3KV ° ±15% (Cleaning,200 ㏁)
- Out Voltage Trigger : 6.5 ㎂
- Input Voltage Variation : ± 5 % below(Variation 21.6V°≠26.4V)
  Load Variation : ± % below
- Out Voltage Rising Time : 100 ms Max
- Out Voltage Falling Time : 100 ms Max
- Transfer Variation Voltage on Environment Variation : +650 V(Duty 10%) ~ 5KV (Duty 90%)
- Control Method on environment : THV-PWM ACTIVE,transfer Active signal, of environment sensing voltage is input and get feed back current, and recalculate it to resistence .
- Control method on transfer output voltage : It is controlled by changing its duty of THVPWM Signal as follows. 10% Duty : +650V, 90% Duty : +5KV ± 5%

2) Charge Voltage (MHV)

- Input Voltage : 24 V DC ± 15%
- Out Voltage : -1.3KV ~ ±3.2%
- Out Voltage Rising Time : 50 ms Max
- Out Voltage Falling Time : 50 ms Max
- Out Voltage Range : 30 ㏁ ~ 1000 ㏁
- Output Control Signal(MHV-PWM) : CPU is HV output when PWM is Low

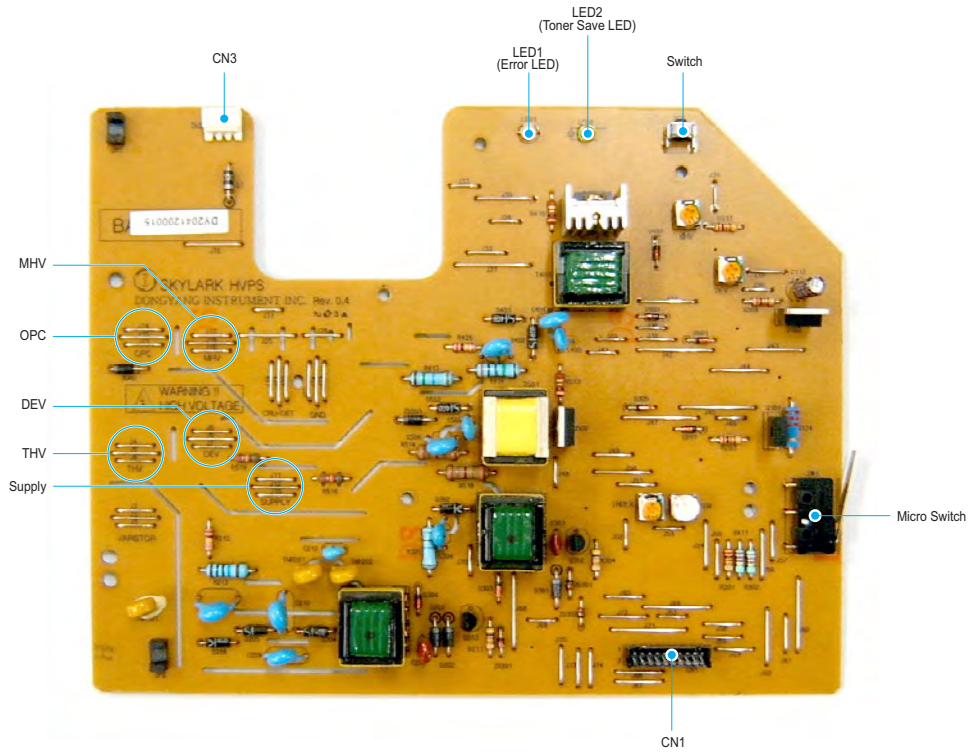
3) Developing Voltage (DEV)

- IInput Voltage : 24 V DC ± 15%
- Output Voltage: -350V ± 4.6%
- Output Voltage Fluctuation range: PWM Control
- Input contrast of the output stability degree : ± 5 % or less
- Loading contrast : ± 5 % or less
- Output Voltage Rising Time : 50 ms Max

- Output Voltage Falling Time : 50 ms Max
- Output Loading range : 10MßŸ ~ 1000 MΩ
- Output Control Signal (BIAS-PWM) : the CPU output is HV output when PWM is low.

4) Supply

- Output Voltage : -550 V ±8.6%(ZENER using, DEV)
- Input contrast of the output stability degree : under ± 5 %
- Loading contrast : ± 5 % or less
- Output Voltage Rising Time : 50 ms Max
- Output Voltage Falling Time : 50 ms Max
- Output Loading range : 10 MΩ ~ 1000 MΩ
- Output Control Signal (BIAS-PWM) : the CPU is HV output when PWM is low.



Input

Pin NO	Signal Name	Remark	Pin NO	Signal Name	Remark
1	+24VS		2	+24VS	
3	+24VS2		4	+24VS2	
5	+3.3V		6	DGND	
7	+5V		8	P_EXIT	
9	THV_PWM		10	THVEN	
11	MHVPWM		12	THVREAD	
13	BIAS-PWM		14	FAN	
15	P_EMPTY		16	CRU_DET	
17	KEY_IN		18	TONERSAVE	
19	ERROR		20	READY	

2.2.2.7 FUSER AC POWER CONTROL

Fuser(HEAT LAMP) gets heat from AC power. The AV power controls the switch with the Triac, a semiconductor switch. The 'ON/OFF control' is operated when the gate of the Triac is turned on/off by Phototriac (insulting part).
In other words, the AC control part is passive circuit, so it turns the heater on/off with taking signal from engine control part.
When the 'HEATER ON' signal is turned on at engine, the LED of PC1 (Photo Triac) takes the voltage and flashes. From the flashing light, the Triac part (light receiving part) takes the voltage, and the voltage is supplied to the gate of Triac and flows into the Triac. As a result, the AC current flows in the heat lamp, and heat is occurred.
On the other hand, when the signal is off, the PC1 is off, the voltage is cut off at the gate of Triac, the Triac becomes off, and then the heat lamp is turned off.

1) Triac (THY1) feature :16A, 600V SWITCHING
2) Phototriac Coupler (PC3)
   . Turn On If Current : 16mA
   . High Repetive Peak Off State Voltage : Min 600V

2.2.3 S/W Structure and Descriptions

The purpose of this document is to describe the design specification of the Engine Control F/W for the ML-1640/2240.

2.2.3.1 Introduction

This Engine Control Firmware is a program that controls LBP Engine of the ML-1640/2240.
This firmware is executed every 10msec as an interrupt routine of the main system. At stand-by state, this firmware monitors the enable print command from the main system. If the enable print command is detected, this firmware controls the Engine Mechanism according to the printing process and paper feeding state. And with the Sleep command or Wake-Up command, this firmware controls the Engine state.

2.2.3.2 Engine Control F/W Overview

Engine Control F/W is executed every 10msec by timer interrupt of main system. And it consists of 3 control modules.

- Engine Main Control, Interface Control and Sensing & Unit Control Module.

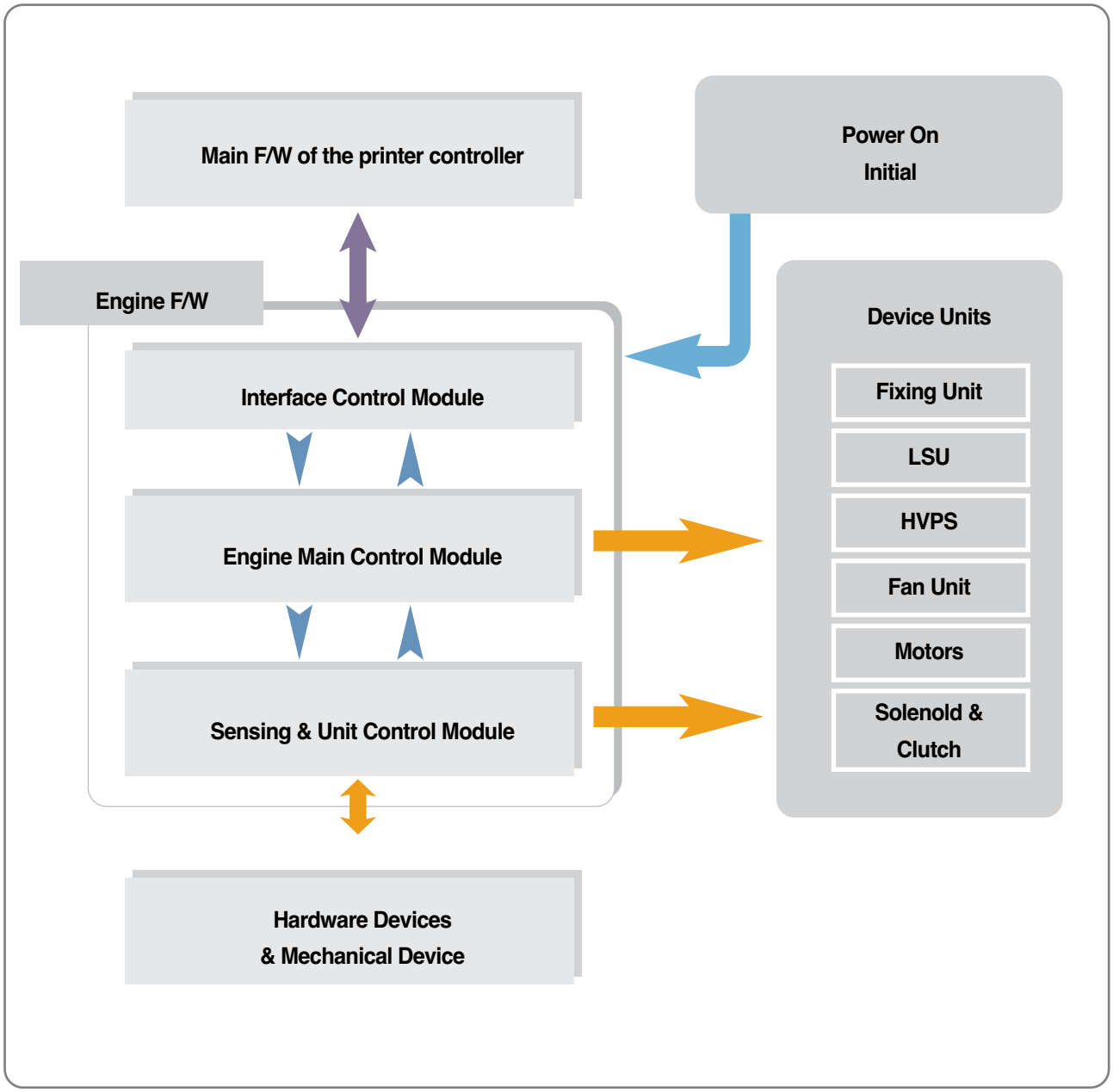
Major operations of the Engine Control F/W are following.

- Control the Pick-Up, Feeding and Discharging of Paper
- Control the LSU
- Control the HVPS for the Developer Process
- Control the Temperature of Fixing unit

Controlling selection to here is added.

- Second Cassette Feeder(SCF) : N/A

- Architecture of Engine Control F/W



2.2.3.3 F/W Architecture of Engine Control Firmware

- The Engine Control Module is executed every 10msec as interrupt job of main system. There are three control modules, i.e., Engine Main Control Module, Engine Interface Module and Sensing & Unit Control Module.

- Probably from usual state it will be able to rehabilitated a prior to entry error state in error condition it is to confirm. When the if rehabilitation is possible then after rehabilitating it goes back in usual state, else with an error condition it goes in error state. Currently the rehabilitation function of the low heat error , the over heat error and the LSU error is embodied.

- Low Heat Error

  When the error occurrs, it does not indicate an error. It stores the present temperature and supplies the heat to the fixing unit during the scheduled time. If the temperature goes up after scheduled time, it goes back to a normal state. However, if not, it is formed that an error occurrs.

- Over Heat Error

  When the error occurs, it informs an error first. It stores the present temperature as well and waits a scheduled time. If the temperature goes down after scheduled time, then it goes back to a normal state. However, if not, it is formed that an error occurrs.

- Lsu Error

  When the error occurrs, it does not indicate an error. It accomplishes printing only again. If even time when it judges an error, it informs an error. Concretely speaking, if the LReady or Hsync error happens, the paper exits out beforehand. And then the engine mode is changed to recovery mode and the engine informs the main system of the engine mode. And the engine checks the LSU error in itself. If the error doesn't happen, the printing job will be proceeding.

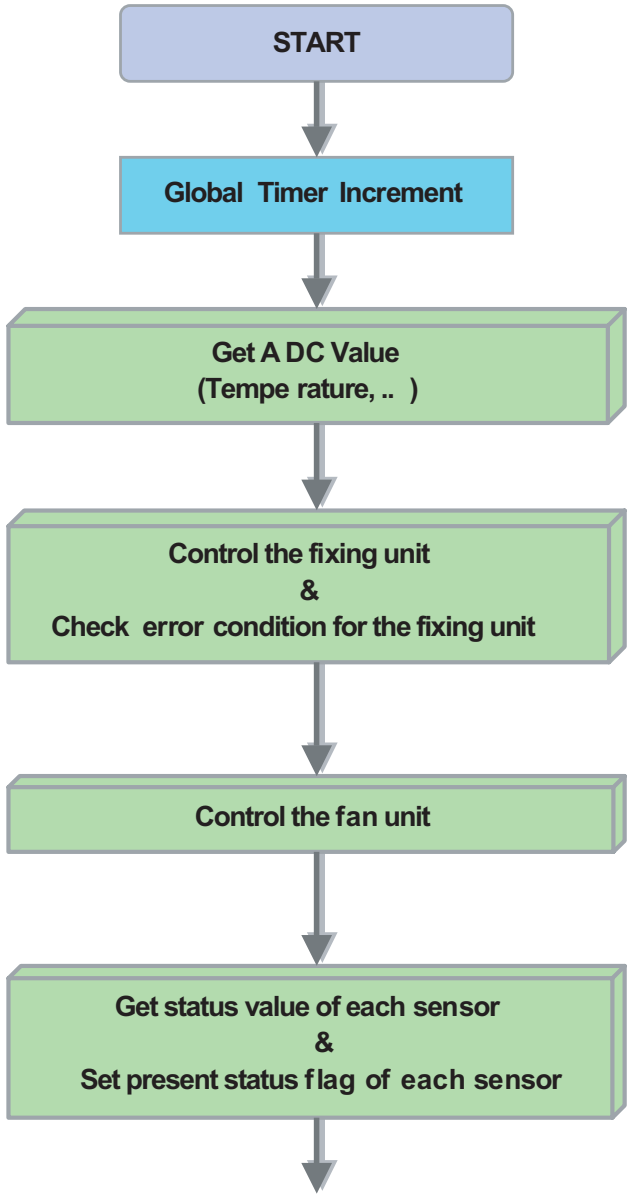
2.2.3.4 Engine Interface Module Design

Engine Interface Module communicates with the main system in order to receive the command from main system and to transmit the present engine status for the requested status. There are two sub functions. One is a function to receive the command from the main system. The other is a function that informs the main system of the current engine status for the requested item.

2.2.3.5 Engine Sensing & Unit Control Module Design

Engine Sensing & Unit Control Module consists of 4 sub-functions. The first function is an ADC function that reads the ADC values of the temperature of the fixing unit. The second one is a fixing unit control function. This function regulates the temperature of the fixing unit within a fixed range to be set by the paper type and the number of pages to print out. The third one is a fan control function that controls the fan unit. And the last one sets the flag that describes the present status of each sensor.

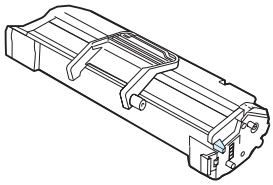
- F/W Architecture



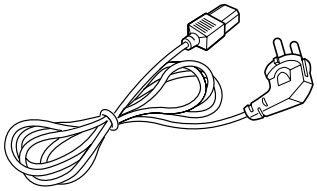
2.2.4 Initial Product Installation

2.2.4.1 Accessory List

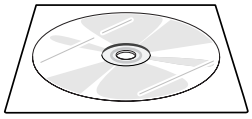
Remove the printer and all accessories from the packing carton. Make sure that the printer has been packed with the following items:



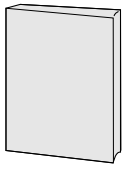
Toner Cartridge



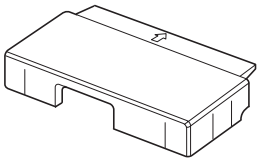
Power Cord



CD-ROM



Quick Install Guide



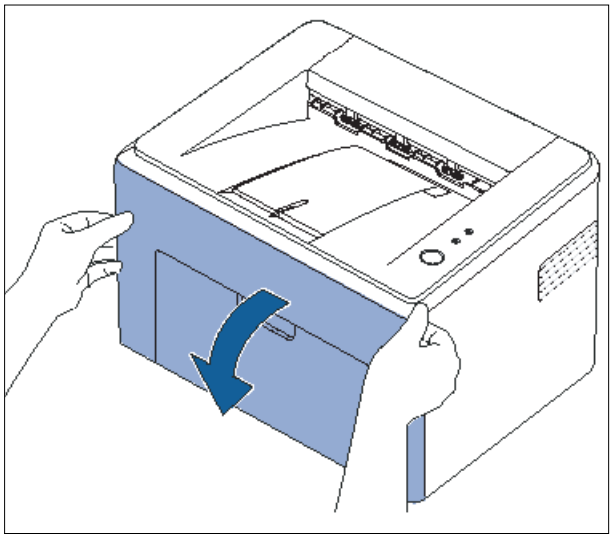
Paper Cover

2.2.4.2 Replacing Toner

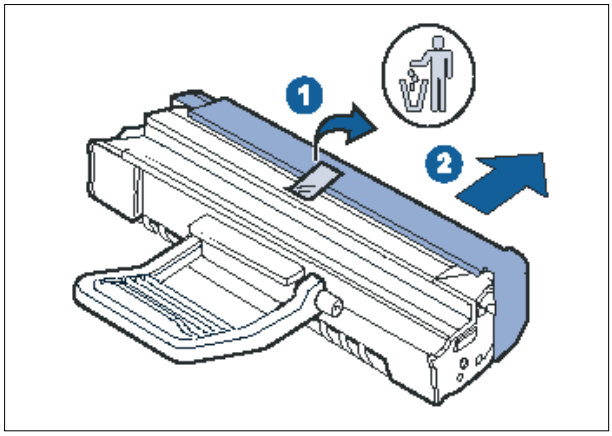
When the status LED lights red, it means the machine cartidge is totally exhausted. Your machine stops printing. Also, the Smart Panel program window appears on the computer telling you to replace the cartridge.
At this stage, the toner cartridge needs to be replaced. Check the type of toner cartridge for your machine.

1. Turn the machine off, then wait a few minutes for the machine to cool.

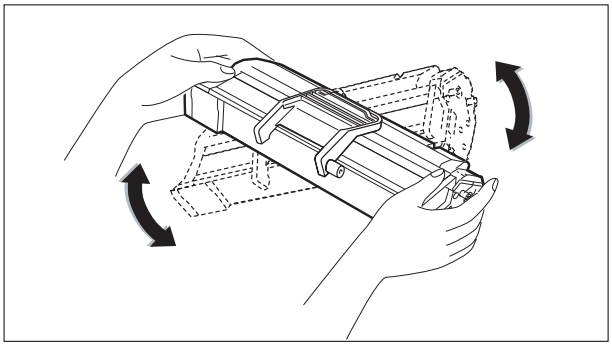
2. Grasp the front cover and pull it toward you to open.



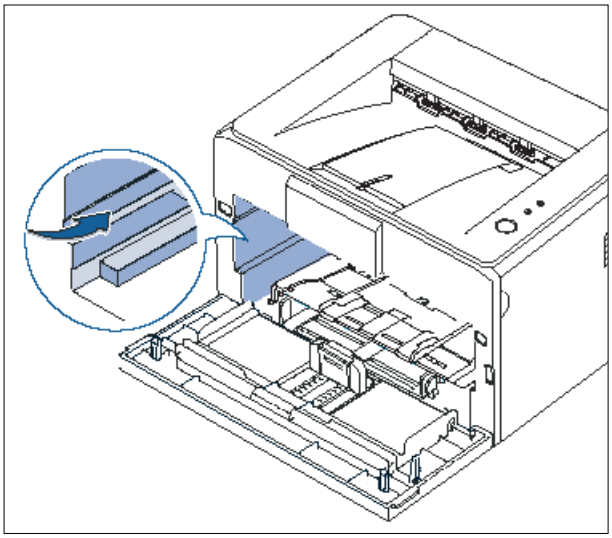
3. Remove the toner cartridge from its bag and remove the cap protecting the cartridge by pulling the packing tape.



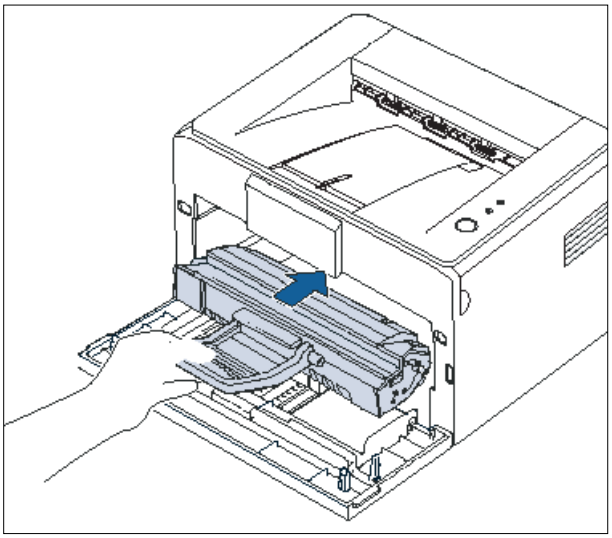
4. Holding both handles on the toner cartridge, thoroughly rock it from side to side to evenly distribute the toner.



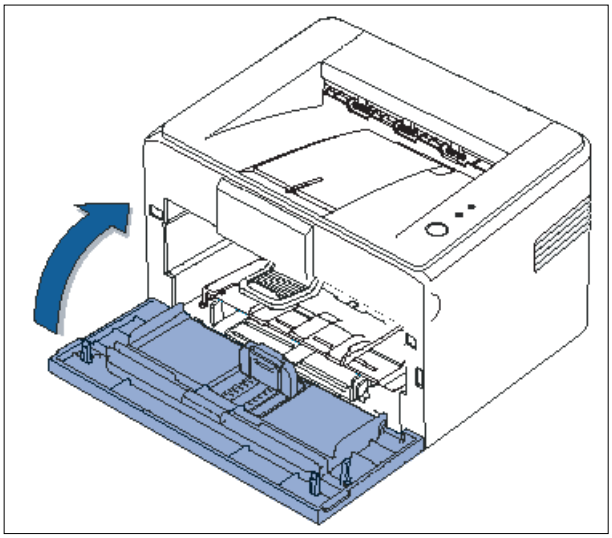
5. Locate the cartridge slots inside the machine, one on each side.



6. Unfold the toner cartridge handle and grasp it. Insert the cartridge in the machine until it snaps into place.



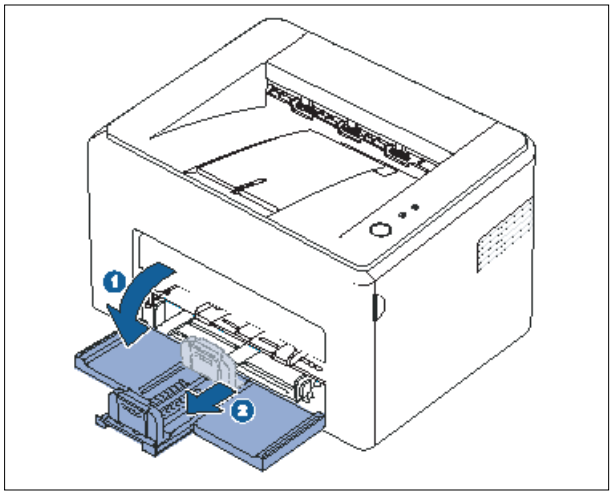
7. Close the front cover. Make sure that the cover is securely closed. If the cover is not firmly closed, printing errors may occur when you print.



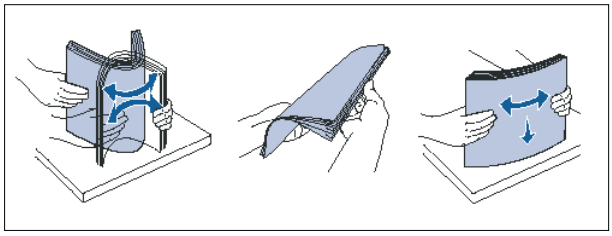
2.2.4.3 Loading Paper

Load the print media you use for the majority of your print jobs in the tray.
The tray can hold a maximum of 150 sheets of 75 g/㎡ (20 lb bond) plain paper.

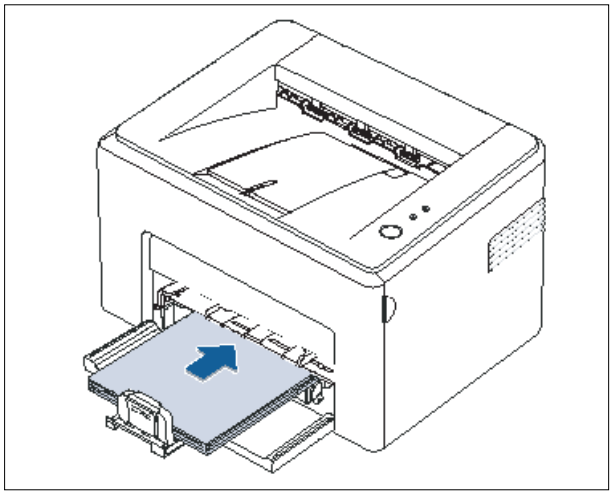
1. Grasp the paper input tray and pull it toward you to open. Pinch the rear guide and pull it out to extend the tray.



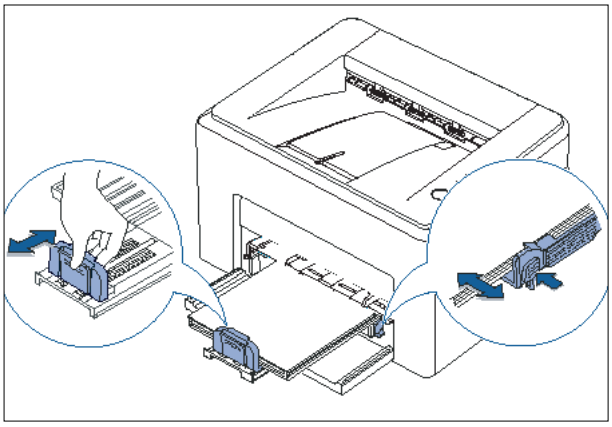
2. Prepare a stack of paper for loading by flexing or fanning them back and forth. Straighten the edges on a level surface.



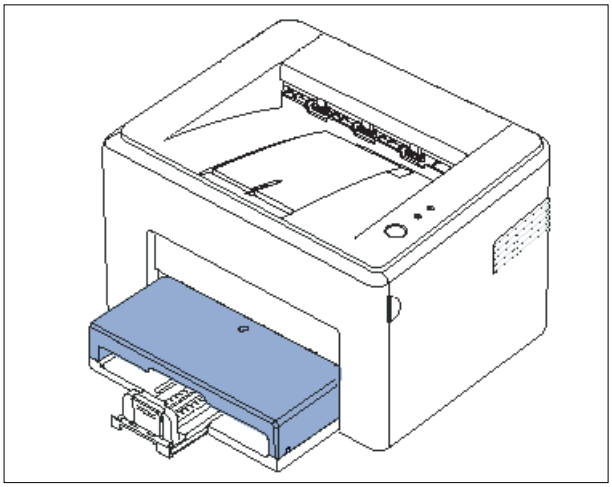
3. Load paper with the print side facing up. Make sure that all four corners are flat in the tray.



4. Pinch the rear guide to adjust for the paper length and pinch the side guide and slide it to the left flush against the paper.



5. If necessary, close the paper cover to keep the paper loaded in the tray from dust.



2.2.4.7 Installing Printer Software

The supplied CD-ROM contains Windows printing software, Linux printing software, on-line User's Guide and Acrobat Reader to view the User's Guide.

1. If you are printing from Windows

- You can install the following printer software using the CD-ROM.
  - Printer driver for Windows. Use this driver to take full

- advantage of your printer's features. For details, see Software User Guide.
  - Status Monitor allows you to see the printing status of the printer. For details, see Software User Guide.

2. If you are printing in Linux

- Go to Software User Guide for information about installing the Linux driver.

3. System Requirements

Your machine supports following operating system.

- Windows 98/Me/2000/XP - The following table shows Windows requirements.

Item	Requirements	
Operating System	Window 98/Me/2000/XP/Vista	
CPU	Window 98/Me/2000/XP	Pentium II 400 or higher
	Window XP	Pentium II 933 Ghz or higher
RAM	Window 98/Me/2000	64 MB or higher
	Window XP	128 MB or higher
Free Disk Space	Window 98/Me/2000	300 MB or higher
	Window XP	1 GB or higher
Internet Explorer	5.0 of higher	

3. Disassembly and Reassembly

3.1 General Precautions on Disassembly

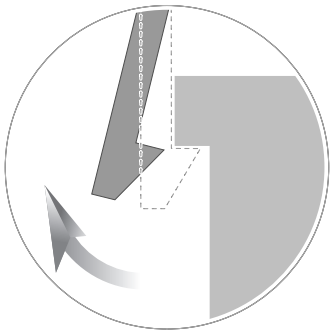
When you disassemble and reassemble components, you must use extreme caution. The close proximity of cables to moving parts makes proper routing a must.
If components are removed, any cables disturbed by the procedure must be restored as close as possible to their original positions. Before removing any component from the machine, note the cable routing that will be affected.

Whenever servicing the machine, you must perform as follows:

1. Check to verify that documents are not stored in memory.
2. Be sure to remove the toner cartridge before you disassemble parts.
3. Unplug the power cord.
4. Use a flat and clean surface.
5. Replace only with authorized components.
6. Do not force plastic-material components.
7. Make sure all components are in their proper position.

Releasing Plastic Latches

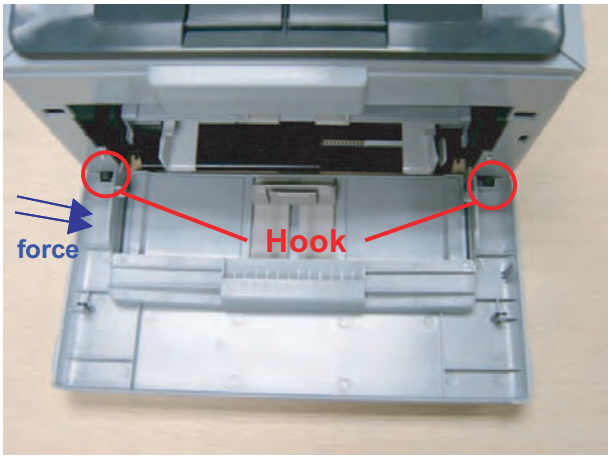
Many of the parts are held in place with plastic latches. The latches break easily; release them carefully.
To remove such parts, press the hook end of the latch away from the part to which it is latched.



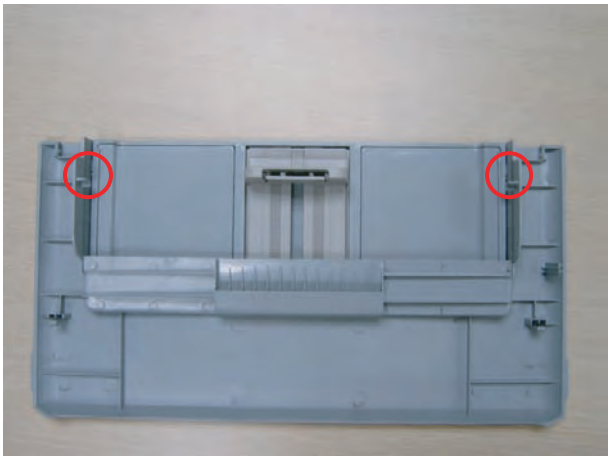
3.2 Disassembly and Reassembly

3.2.1 Front Cover

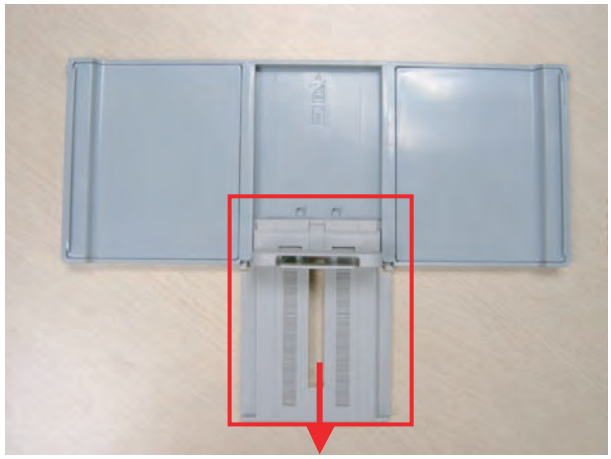
1. Open the front cover. Separate the front cover from the lock the frame by pulling the left bottom.



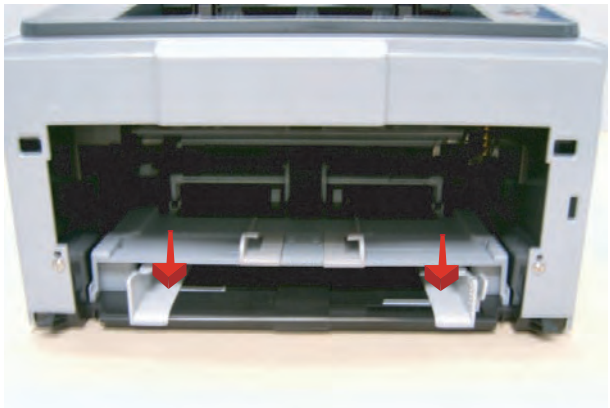
2. If necessary, remove the cassette cover as the same way.



3. If necessary, remove the extension tray by pulling to the direction of arrow.



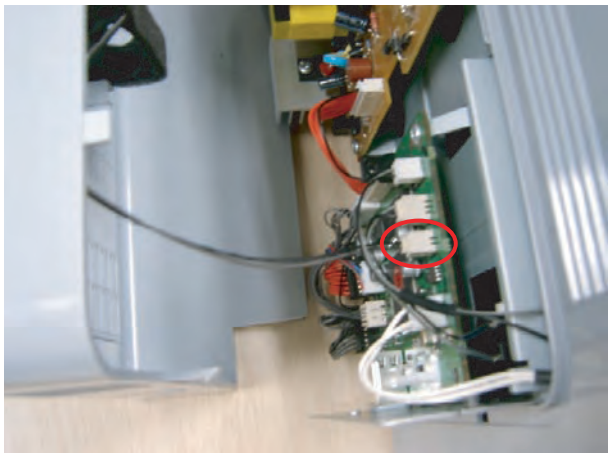
4. Take out the MP tray after remove the toner cartridge.



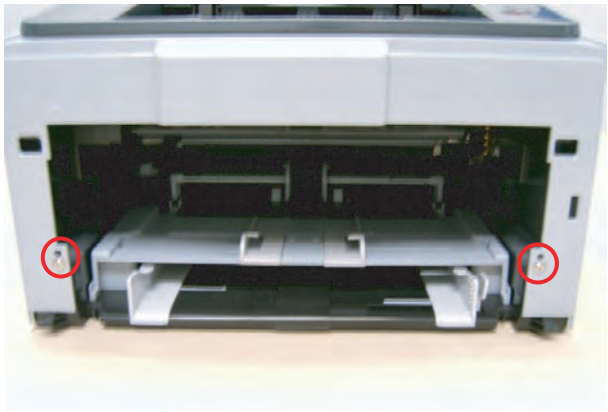
3.2.2 Main Cover

1. Remove the SMPS cover after remove the 2 screws. And remove the 2 screws from the rear bottom of SET.

2. Release the SMPS cover after unplug the 1 connector from Main PBA.

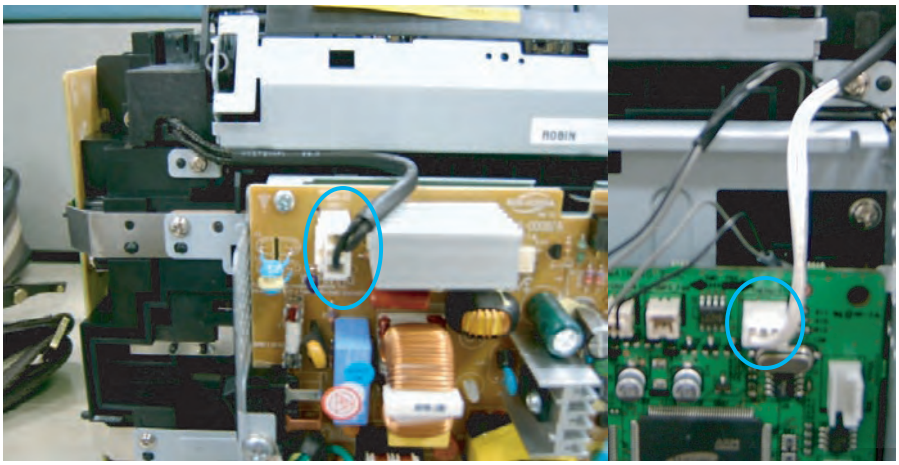


3. Lift the Main Cover after remove the 2 screw.

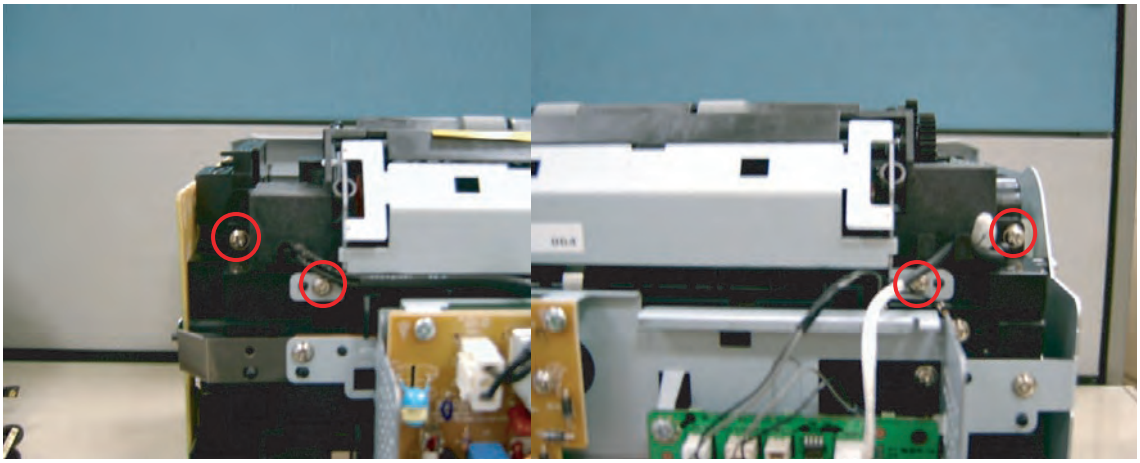


3.2.3 Fuser unit

1. Unplug the 2 connector from Main PBA and SMPS board.

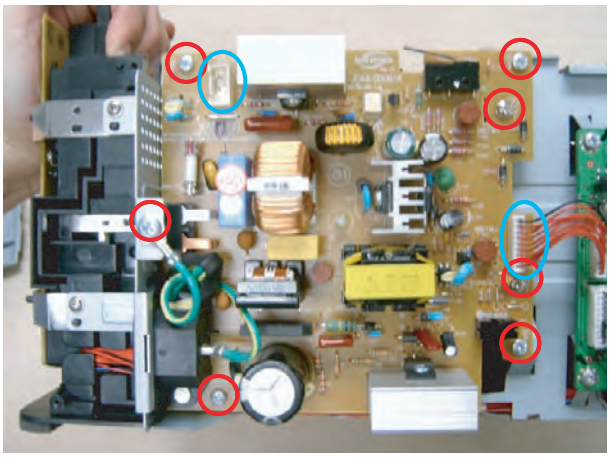


2. Release the Fuser unit after remove the 4 screws.



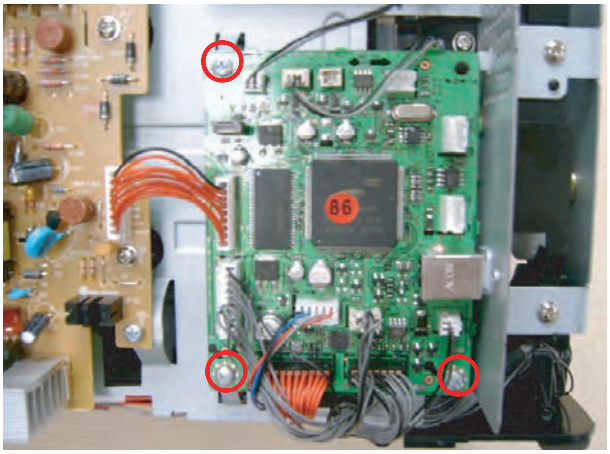
3.2.4 SMPS board

- Before Disassembling, Separate the SMPS cover. (Refer to 3.3)
- Remove the SMPS board after remove the 7 screws and 2 harness.



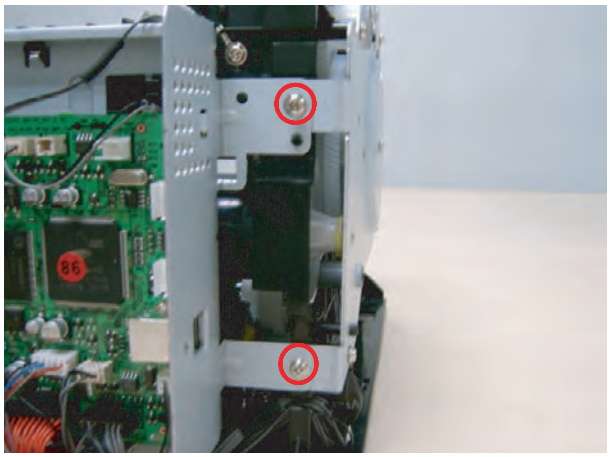
3.2.5 Main PBA

- Before Disassembling, Separate the SMPS cover. (Refer to 3.3)
- Remove the Main PBA after remove the 3 screws and all harness.

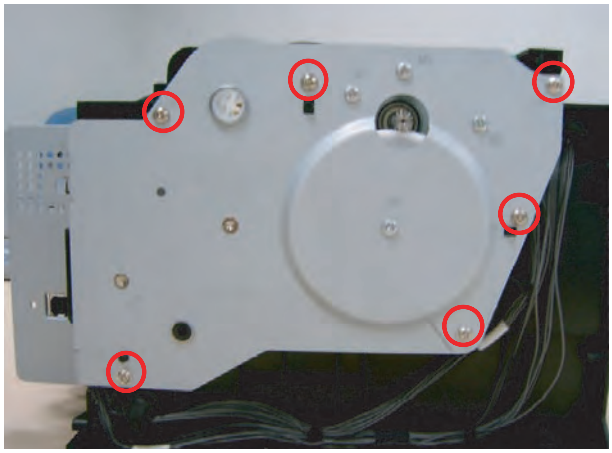


3.2.6 Drive unit

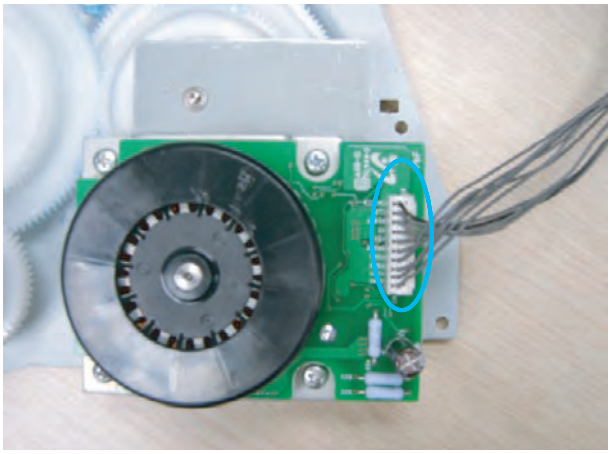
1. To remove the Drive assy, first remove the Main cover (refer to 3.3). And remove the 2 screws as shown below.



2. Remove the 6 screws and then release the Drive unit.

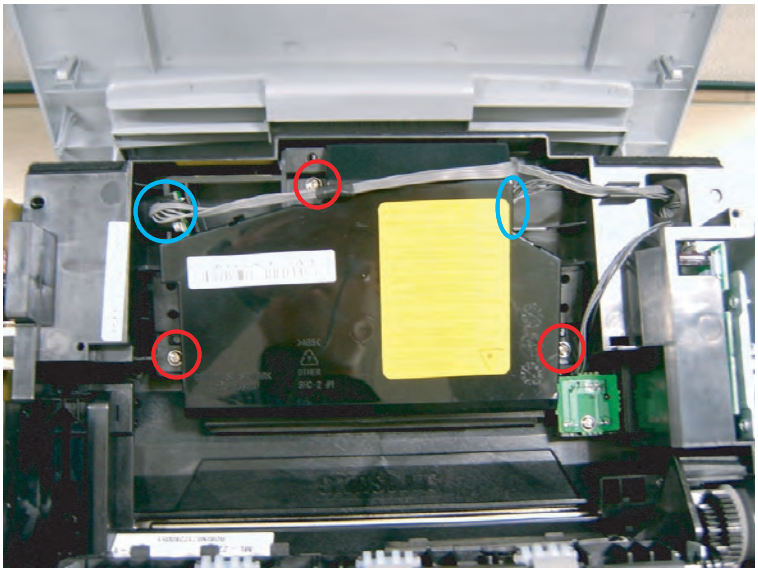


3. Unplug the one harness.



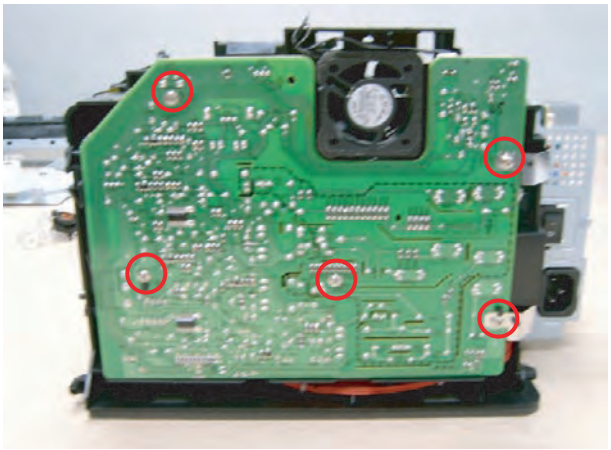
3.2.7 LSU

• Before disassembling, Separate the Main cover. (Refer to 3.3)
• Release the LSU after remove the 3 screws and 2 harness.

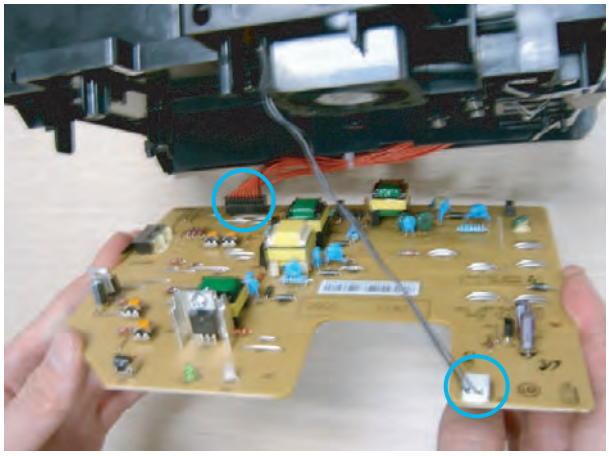


3.2.8 HVPS board

1. Remove the 5 screws.

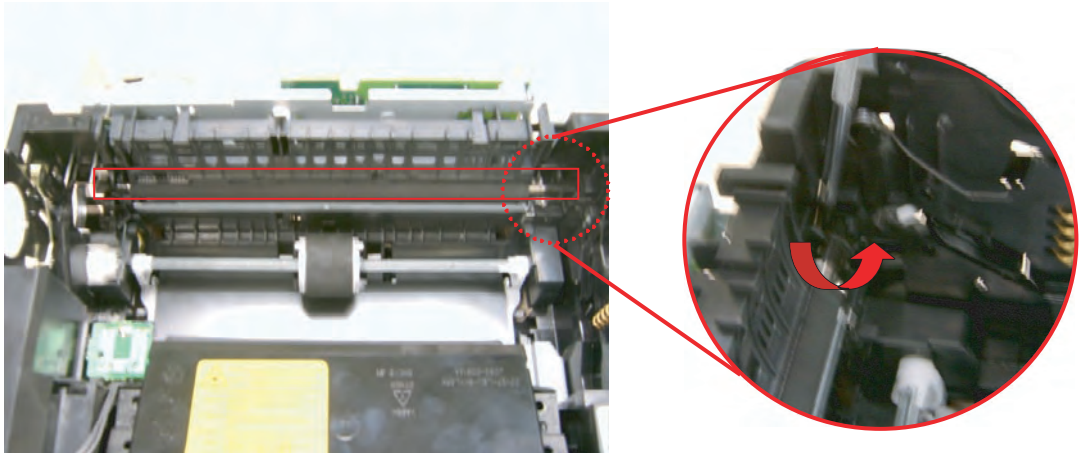


2. Remove the 2 connector as shown below.



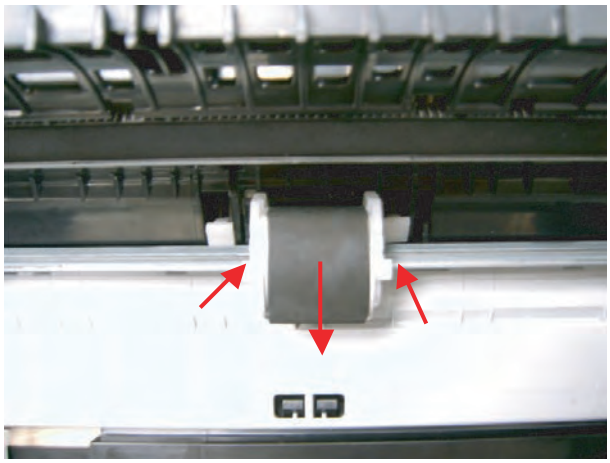
3.2.9 Transfer roller

• Before disassembling, Separate the Main cover (refer to 3..3) and Fuser unit (refer to .3.4)
• Remove the transfer roller by lift up the edge with any tool.



3.2.10 Pick up roller

1. Remove the hook of both side. And pull the pick-up roller to the direction of arrow.



4. Adjustment and Troubleshooting

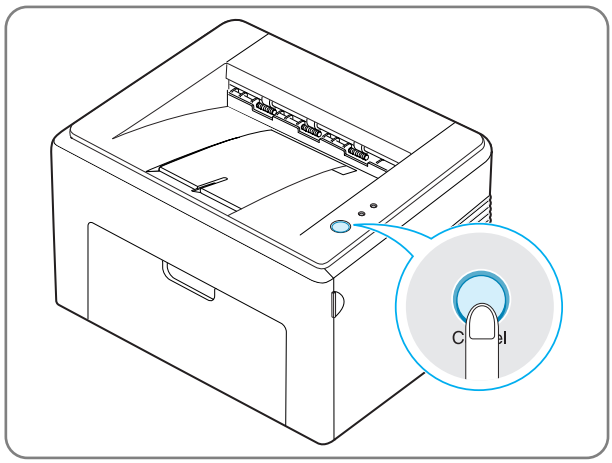
4.1 Alignment and Adjustments

4.1.1 Sample Pattern

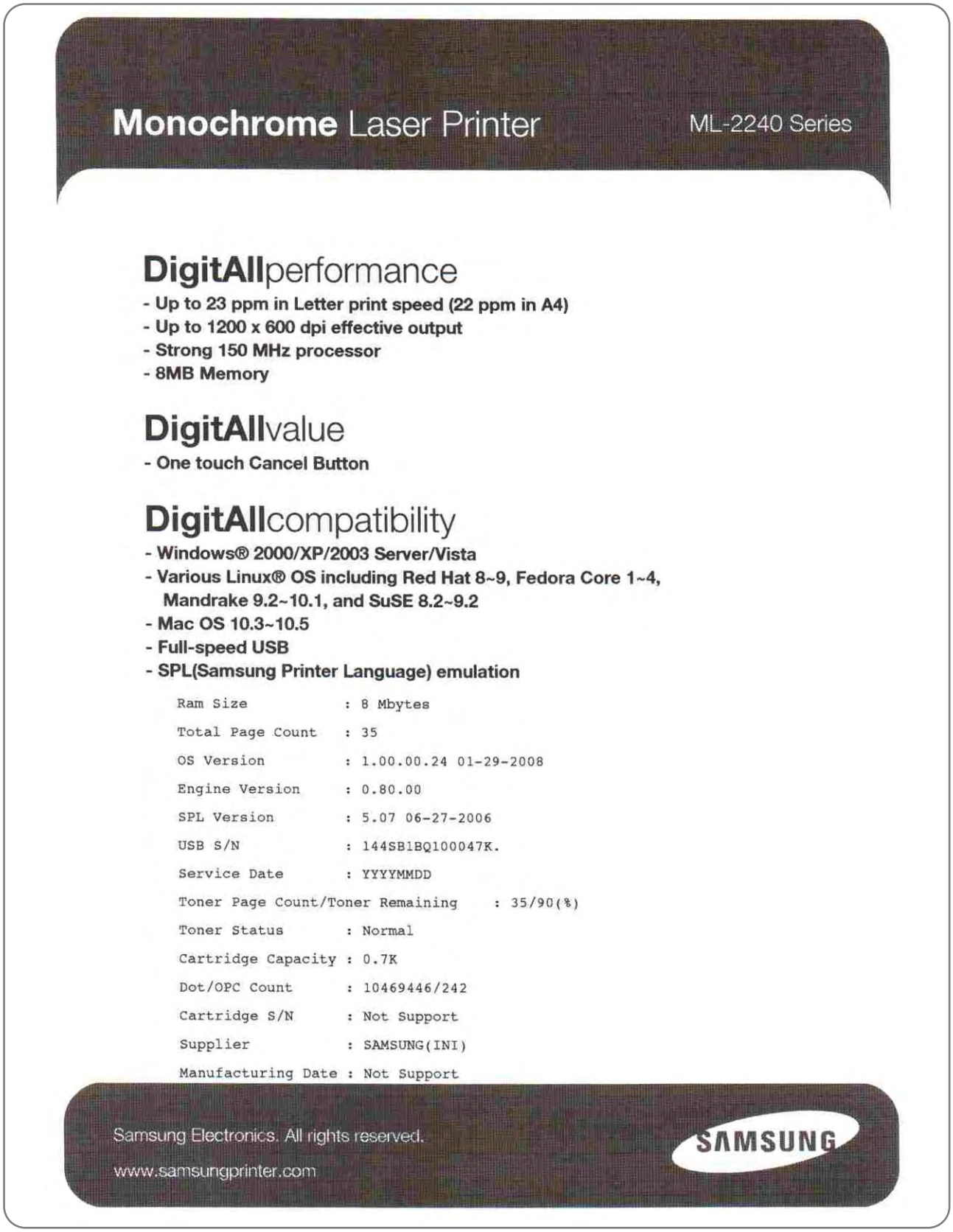
This product has the several sample patterns for maintenance. With the sample patterns, check the existence of the abnormality. The patterns help to regularly maintain the product.

4.1.1.1 Printing a Demo Page

Print a demo page or a configuration sheet to make sure that the printer is operating correctly.
1) Hold down the Cancel button for about 2 seconds to print a demo page.



2) The Demo page or the configuration sheet shows the printer's current configuration.



Monochrome Laser Printer ML-2240 Series

DigitAllperformance

- Up to 23 ppm in Letter print speed (22 ppm in A4)
- Up to 1200 x 600 dpi effective output
- Strong 150 MHz processor
- 8MB Memory

DigitAllvalue

- One touch Cancel Button

DigitAllcompatibility

- Windows® 2000/XP/2003 Server/Vista
- Various Linux® OS including Red Hat 8~9, Fedora Core 1~4, Mandrake 9.2~10.1, and SuSE 8.2~9.2
- Mac OS 10.3~10.5
- Full-speed USB
- SPL(Samsung Printer Language) emulation

```
Ram Size            : 8 Mbytes
Total Page Count    : 35
OS Version          : 1.00.00.24 01-29-2008
Engine Version      : 0.80.00
SPL Version         : 5.07 06-27-2006
USB S/N             : 144SB1BQ100047K.
Service Date        : YYYYMMDD
Toner Page Count/Toner Remaining    : 35/90(%)
Toner Status        : Normal
Cartridge Capacity  : 0.7K
Dot/OPC Count       : 10469446/242
Cartridge S/N       : Not Support
Supplier            : SAMSUNG(INI)
Manufacturing Date  : Not Support
```

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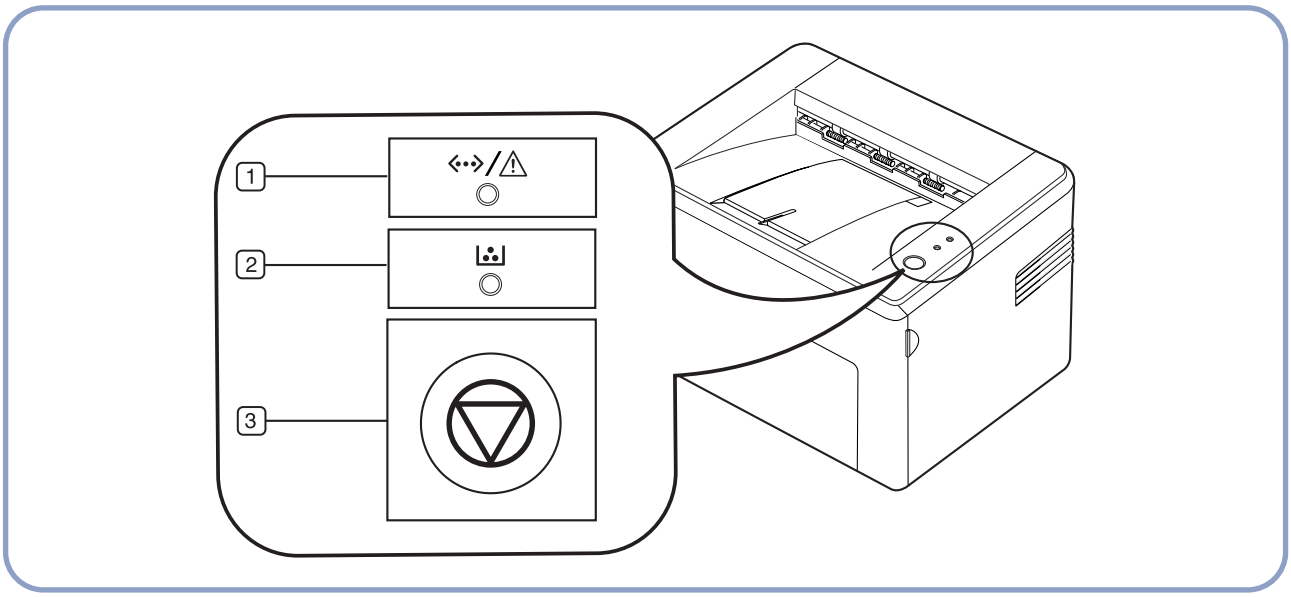
www.samsungprinter.com

SAMSUNG

4.1.2 Control Panel

4.1.2.1 OP Panel



1 Status LED	Shows the status of your machine.
2 Toner LED	Shows the status of the toner cartridge.
3 Cancel	Stops an operation at any time and there are more functions.

4.1.2.2 Understanding The Control Panel

The color of the status and toner LED indicates the machine's current status.

On-Line/Error LED

STATUS		DESCRIPTION
Green	On	The machine is warming up or ready to receive the data.
	Blinking	The machine is printing data.
Red	On	• The machine is experiencing an error, such as open cover, paper empty, installer error, or invalid error. • The machine is experiencing a service required error, such as LSU error, or fuser error.
Orange	On	The machine is experiencing an error such as jammed paper.

Toner LED

STATUS		DESCRIPTION
Red	On	The toner is exhausted, machine will stop printing. Replace the toner cartridge.
	Blinking	The toner is low, replace the toner soon.
	Rapidly blinking	The toner is empty, replace the toner.

LED on error status

Machine Status	LED	LED Display	Smart Panel
Paper Empty	On-Line/Error LED	Red LED On	O
Paper Jam0	On-Line/Error LED	Orange LED On	O
Paper Jam1	On-Line/Error LED	Orange LED On	O
Paper Jam2	On-Line/Error LED	Orange LED On	O
CoverOpen	On-Line/Error LED	Red LED On	O
MotorError	On-Line/Error LED	Red LED On	O
LSU Hsync Error	On-Line/Error LED	Red LED On	O
LSU Motor Error	On-Line/Error LED	Red LED On	O
Thermistor OpenError	On-Line/Error LED	Red LED On	O
Fuser High Error	On-Line/Error LED	Red LED On	O
Fuser Low Error	On-Line/Error LED	Red LED On	O
Toner Low	Toner LED	Red LED Blinking : 2.5sec On / Off	O
Replace Toner (Toner Empty)	Toner LED	Red LED Blinking : 1.0sec On / Off	O
Replace Toner (Toner Exhausted)	Toner LED	Red LED On	O H/Stop
Installer Error	On-Line/Error LED	RED LED On	O H/Stop
Invalid Error	On-Line/Error LED	Red On	O H/Stop
Genuine Error	On-Line/Error LED	Red On	O

Cancel button

STATUS	DESCRIPTION
Printing demo page	In ready mode, press and hold this button until the status LED blinks, and release.
Canceling print job	Press this button during printing. The red LED blinks while the print job is cleared from both the machine and the computer, and then the machine returns to ready mode. This may take some time depending on the size of the print job.
Manual print	Press this button during printing. The On Line/Error LED blinks while the print job is cleared from both the machine and the computer, and then return to ready mode. This may take some time depending on the size of the print job. In Manual Feed mode, you can't cancel the print job by pressing this button.

4.1.3 Consumables and Replacement Parts

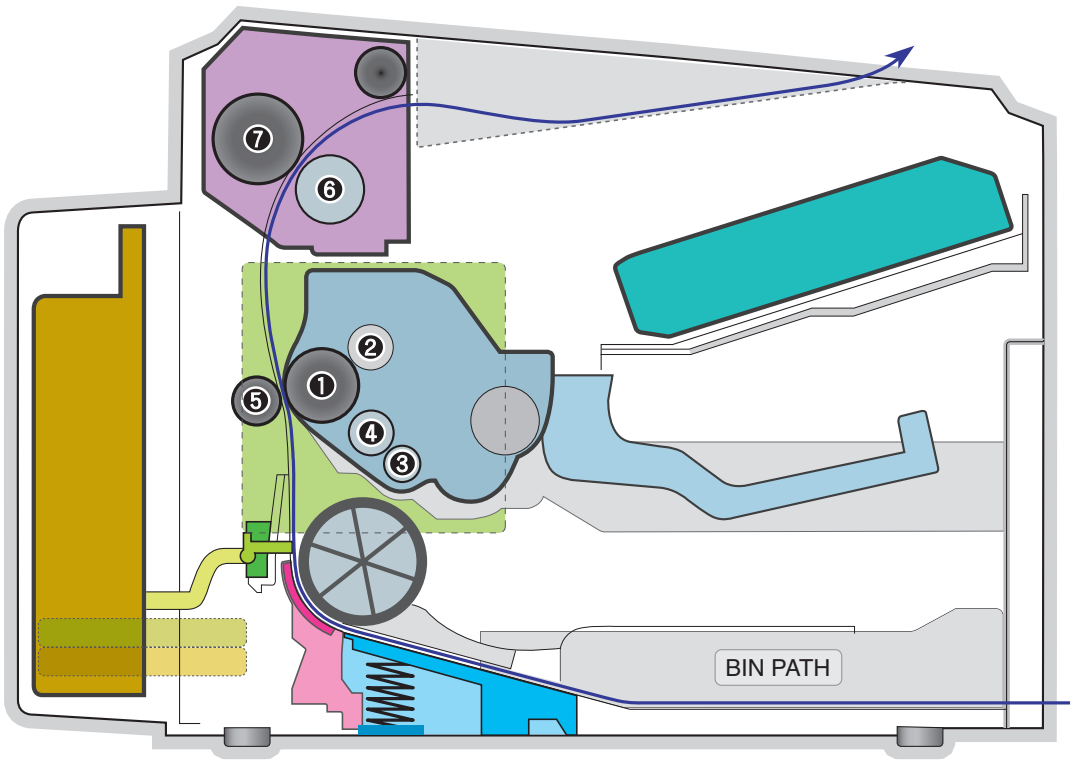
The cycle period outlined below is a general guideline for maintenance.
A printer can't transmit or receive documents this line is for fax machines.
Environmental conditions and actual use will vary these factors.
The cycle period given below is for reference only.

COMPONENT	REPLACEMENT CYCLE
Pick-up Roller	50,000 Pages
Transfer Roller	50,000 Pages
Fuser	50,000 Pages
Toner Cartridge	1,500 Pages(Sales), 700 Pages(Initial)

4.1.4 Periodic Defective Image

If the delinquent image regularly occurs in the printed-paper, it is due to delinquent or damaged roller.
Refer to the table in below and check the condition of the roller.

No	Roller	Defective image	Typical defect
1	OPC Drum	75.5mm	white spot on black image or black spot
2	Charge Roller	37.7mm	black spot
3	Supply Roller	47.5mm	light or dark horizontal image band
4	Developing Roller	35.2mm	horizontal image band
5	Transfer Roller	46.2mm	image ghost
6	Heat Roller	63.9mm	Black spot and image ghost
7	Pressure Roller	75.4mm	black spot on the backside

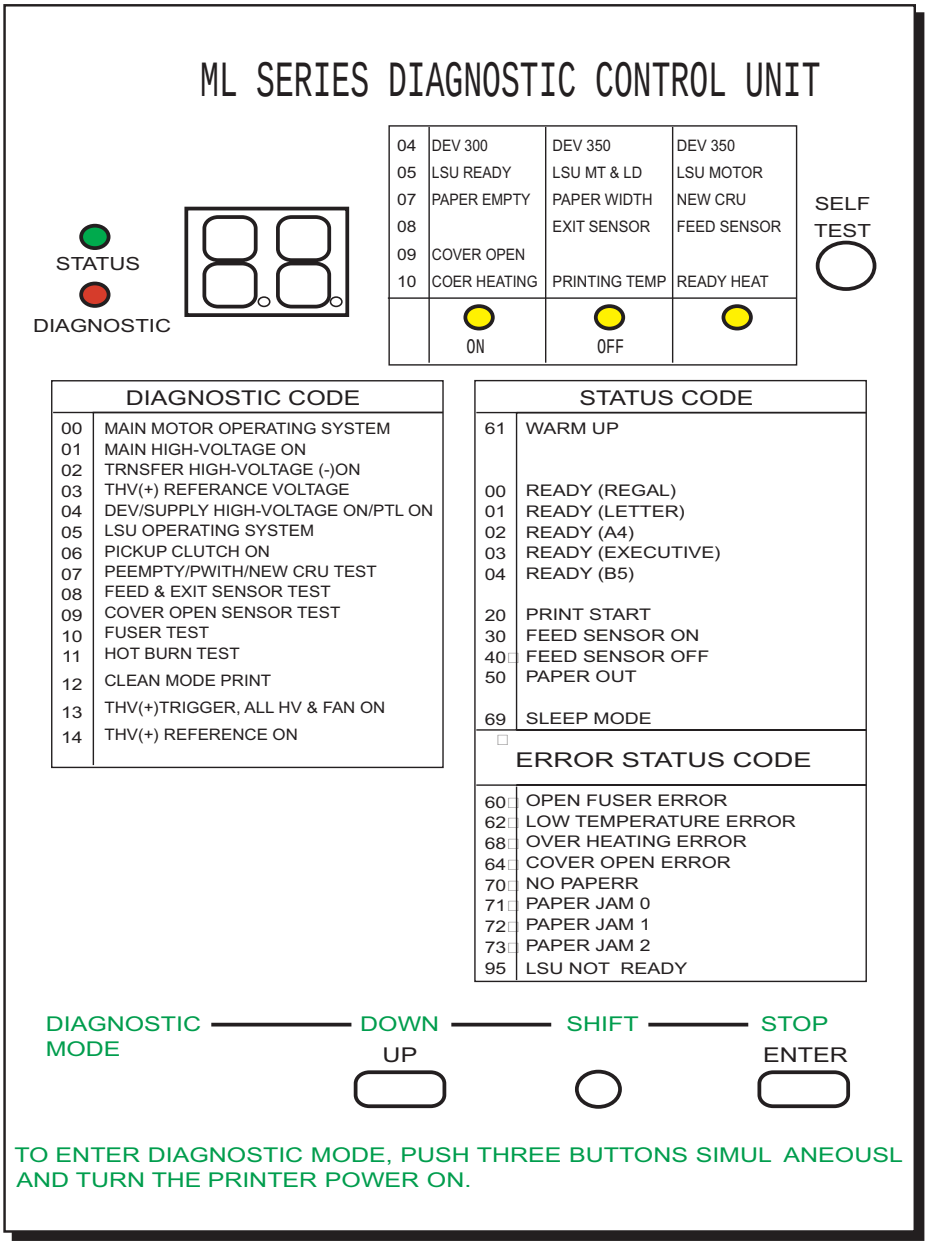


1 OPC Drum
2 Charge Roller
3 Supply Roller
4 Developing Roller
5 Transfer Roller
6 Heat Roller
7 Pressure Roller

4.1.5 How to use DCU

4.1.5.1 DCU Setup

You can examine the malfunction of the printer. To perform DCU, open the front discharge cover and leave the connect the harness wire(10 pin/4 pin) to the CN1(ML-1640/2240) of the Main control board.



4.1.5.2 Code

Connect DCU to the printer and turn the power on. It show 7 Segment FND on the panel and each code tells the function of the printer.

1) Normal Code

While printing or warming up, it indicate the position of the paper

Code	State	Description
61	Warm up	The printer is on, the cover is open or close.
00~05	Ready(kind of paper)	The printer is ready, the paper is detected when the first paper is printed. 00: Legal ,01: Letter ,02: A4 ,03: EXEC ,04: B5 ,05: Folio, 06: A5/A6
20, 21, 22	Print Start	The engine controller received the print order from the video controller. 20: 1st, 21: MP, 22: SCF
30	Feed Sensor On	The paper is passing out of the Feed Sensor.
40	Feed Sensor off	The paper has passed out of the Feed Sensor.
50	Paper Out	The paper has passed out of Exit Sensor.
69	Sleep Mode	The fuser power turned off to minimize the power consumption.

2) Error Code

When detecting the malfunction, the printing is stopped to indicate error code.

Code	State	Description
60, 62, 68	Fuser Error	The error in the fuser occurred. There is a short circuit in the thermistor and the thermostat while printing, Low Temperature Error occurs. • 60: Open Fuser Error • 62: Low Heat Error • 68: Over Heat Error
64	Cover Open	The Printer Cover is open.
65	CRU Error	The Toner Cartridge not installed,
70	No Paper	No paper in the paper cassette.
71	Paper Jam 0	The front part of paper is jammed between pickup unit and Feed sensor.
72	Paper Jam 1	The front part of paper is jammed between the Discharge sensor and Feed sensor.
73	Paper Jam 2	The front part of paper is jammed just after passing through the discharge sensor.
76	Out Bin Full	The Out bin is filled with paper.
95	LSU Not Ready	LSU Scanner Motor not ready or Hsync signal not output.

4.1.5.3 Self Diagnostic Mode

If Error code occurs due to malfunction of the printer, perform Self Diagnostic Mode to solve the problem.

The printer works only in the self-test mode to solve the malfunction problem.
To enter the self-test mode, turn the power on pressing the buttons of [Down], [Shift] and [Stop] at the same time. Release the button within 2 or 3 seconds if 78 shows in the DCU. If 00 shows in the DCU, press the button [Up] or [Shift] to select the self+test , and press the button of [Enter] to operate. To stop, press the button of [shift] and [Enter] together.

Code	Description
00	**Main Motor Operating System** Only the main motor is in operation.
01	**Main High Voltage On(THV-)** -1400 voltage output by MHV terminal. Caution : High voltage probe should be used.
02	**Transfer High Voltage(-)On(THV-)** -1000 voltage output by MHV terminal. Caution : High voltage probe should be used.
03	**Transfer High Voltage (+)Reference on (THV +)** +1300 voltage output by MHV terminal. Caution : High voltage probe should be used.
04	**DEV/supply High Voltage** : DEV/Supply High Voltage Test. The left one of the three LEDs in the self-test panel is on when DEV high voltage Supply high voltage output by each HV terminal. Press the [Up] button to switch the voltage. The middle and right one of the three LEDs are on and -350 voltage output by DEV HV terminal. Caution : High voltage probe should be used.
05	**LSU Operating System** The scanning motor of LSU is in operation, the right LED of the three buttons on. Press the [Up] button to Check LD. LD is functioning and the middle button is on. If the LD is normal, all LEDs are on.
06	**Pickup clutch on** The Solenoid in the printer is in operation. To stop the operation, Press the button [shift] and [Enter] together.

Code	Description
07	Paper Empty Sensor Test : If activate the Actuator of the PEMPTY Sensor, the left and right of the three LEDs are on. Paper Empty Sensor ON/OFF 1st LED ON/OFF
08	Feed & Exit Sensor Test Test the Feed sensor and Discharge sensor in the same way as '07'. Feed Sensor ON/OFF 2nd LED ON/OFF Exit Sensor ON/OFF 3rd LED ON/OFF
09	Cover Open Sensor Test Test the Cover Open Sensor in th same way as code '07' Cover Open Sensor ON/OFF1st LED ON/OFF
10	Fuser Test If the [Enter] button pressed, the right LED is on and temperature of the fuser is up to READY Mode. If the [Up] button pressed, the middle LED is on and temperature of the fuser is up to Printing Mode. If you press the button once more, the left LED is on and temperature of the fuser is up to overheat Mode.
11	Hot Burn Test If the [enter] button pressed, the printer is continuously printing without detection. Turn the power off to stop operation.
12	Cleaning Mode Print Mode Print the paper to clean the OPC Drum in the Cartridge.
13	THV(+) TRIGGER. ALL HV : All high voltage output by each HV terminal and LSU and the fan is in operation. In this mode, electronic resistance of transfer roller and high voltage is detected.
14	PTL Test : (ML-1610 : not design) Indicates the function of the PTL, same method of the code ‘07’.
15	Fan Test : Indicates the function of the Fan, same method of the code ‘07’.
16	Manual Pickup Test : Indicates the function of th Manual Pickup, same method of the code ‘07’.
17	Manual Sensor Test : Indicates the function of the Manual Sensor, same method of the code ‘07’.

No.	Function	Enter	Up/Down	Stop	Remark
00	Motor	Motor Run		Motor Stop	
01	MHV	Mhv On		Mhv Off	-1300V
02	THV(-)	Thv Negative On		Thv Negative Off	-1000V
03	THV(+)	Thv On		Thv Off	+1300V
04	DEV	Dev On	Supply: 0 : -550V / DEV: 0 : -350V	Dev Off	-350V
05	LSU	LSU Run	● On ● Off ● Ready	LSU Stop	020mV
06	PickUp	Pickup On		Pickup Off	
07	PEmpty		● ● ● Paper Empty		
08	Sensor		● ● Exit ● Feed		
09	Cover		● Cover Open ● ●		
10	Fuser	Fuser On		Fuser Off	
11	HotBurn	HotBurn On			
12	Clean Print	Clean Printing			
13	Thv Reference		● low ● adequate ● high		
14	PTL	PTL On		PTL Off	PTL ± %
15	FAN	Fan On		Fan Off	
16	Manual PickUp	ManualPickup On		ManualPickup Off	
17	Manual Sensor		● ● ● ManualSensor		

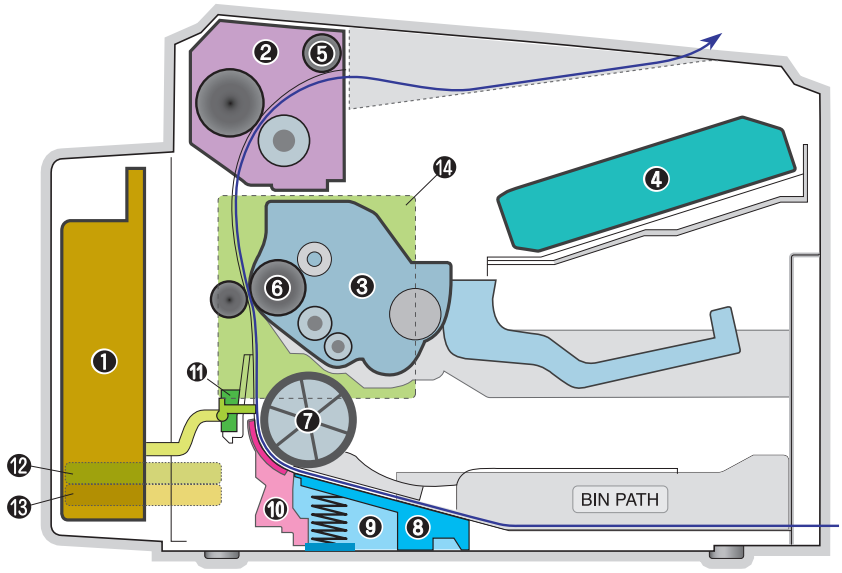
<DCU Function Table>

4.1.5.4 Self Test Button

If the Self-Test button pressed, vertical lines are printed.

Turn the power on while pressing this button, '89' shows in the DCU and the printer is warming up. After warming-up the printer is in READY Mode, and '88' shows in the DCU. In this mode, without any detection, the printer begins printing(trial printing and data from the PC). It is convenient to use this mode when the engine malfunction is detected in the control board.

4.1.6 Paper Path



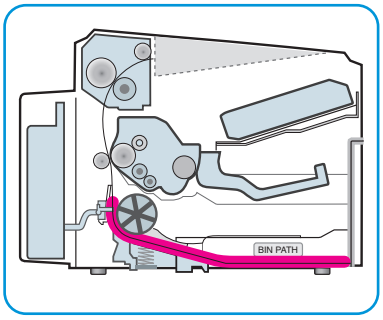
❶ SMPS	❷ Fuser
❸ Toner Cartridge	❹ LSU
❺ Exit Roller	❻ OPC
❼ Pick-Up Roller	❽ KNOCK-UP PLATE
❾ KNOCK-UP PLATE DOWN	❿ ASS'Y HOLDER PAD
⓫ Feed Sensor	⓬ MAIN PBA
⓭ SMPS	⓮ HVPS

1) After taking order, the printer feeds the printing paper from the cassette or manual feeder.

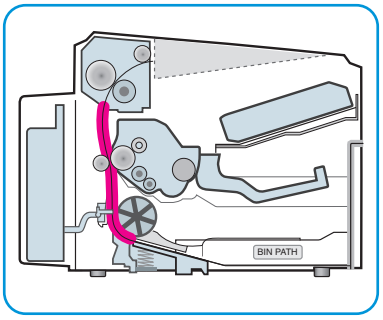
2) The fad paper passes the paper feeding sensor. (Jam 0 occurs if the sensor is not operated after certain time passes)

3) The paper passed the paper feeding sensor moves to the paper exit sensor via printing process. (Jam 1 occurs if the sensor is not operated after certain time passes)

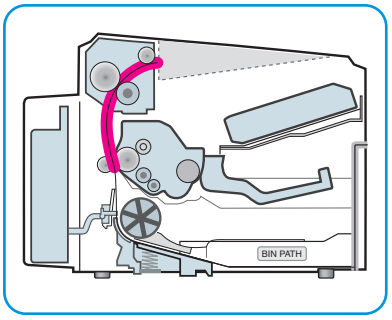
4) The paper passed the paper exit sensor moves out from the set. (Jam 2 occurs sometime after if the tailing edge of the paper is not coming out from the set after the leading edge of paper passes the paper exit sensor.)



〈Jam0〉



〈Jam1〉



〈Jam2〉

4.1.6.1 Clearing Paper Jams

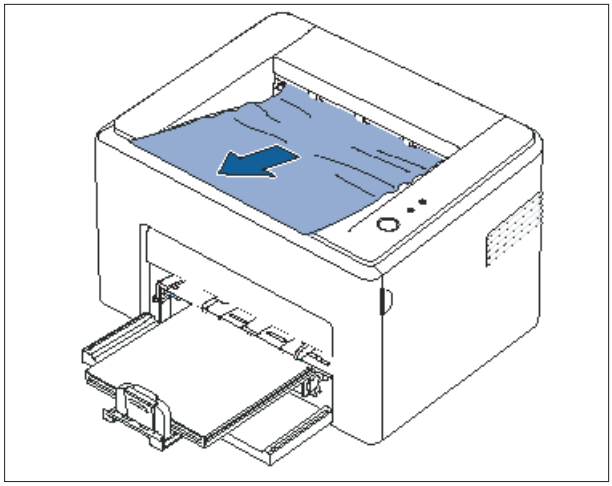
Occasionally, paper can be jammed during a print job. Some of causes include:

- The tray is overfilled.
- The front cover has been opened during a print job.
- Paper that does not meet paper specifications has been used.
- Paper that is outside of the supported size range has been

If a paper jam occurs, the On Line/Error LED on the control panel lights orange. Find and remove the jammed paper. If it is invisible, look inside the printer.

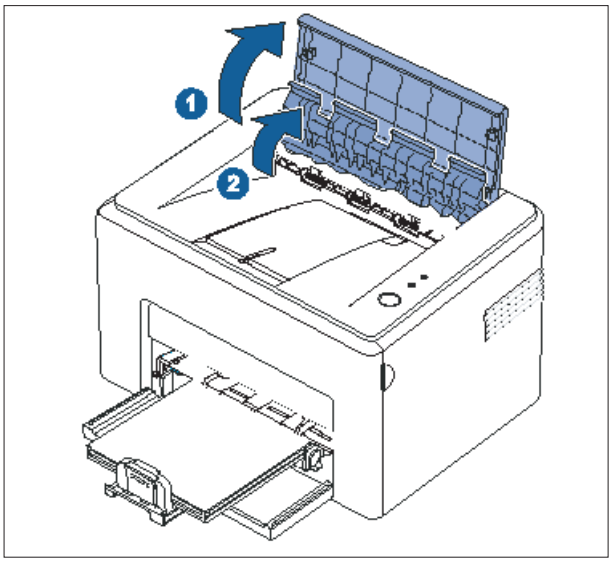
4.1.6.2 In the Paper Exit Area

1. If the paper jams as it exits to the output tray and a long portion of the paper is visible, pull the paper straight out.

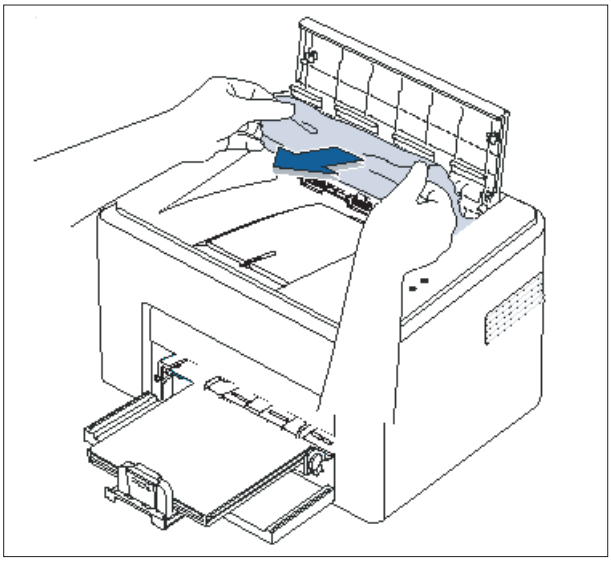


When you pull the jammed paper, if there is resistance and the paper does not move immediately, stop pulling. Continue with the next step.

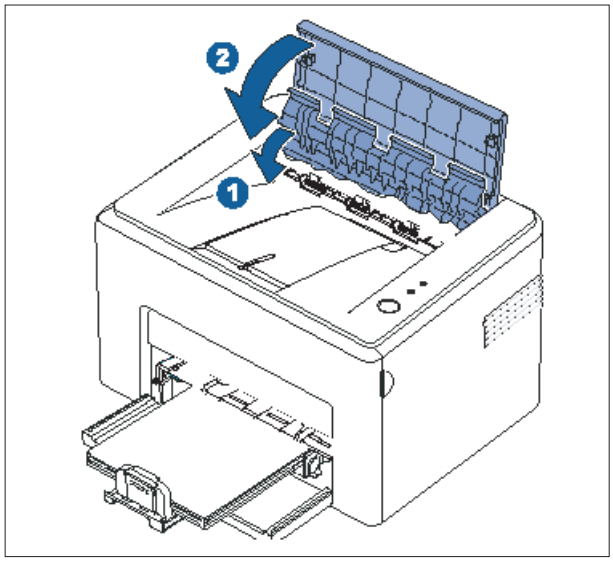
2. Open the top cover and the inner cover.



3. Loosen the paper if it is caught in the heat rollers. Then pull the paper gently out.

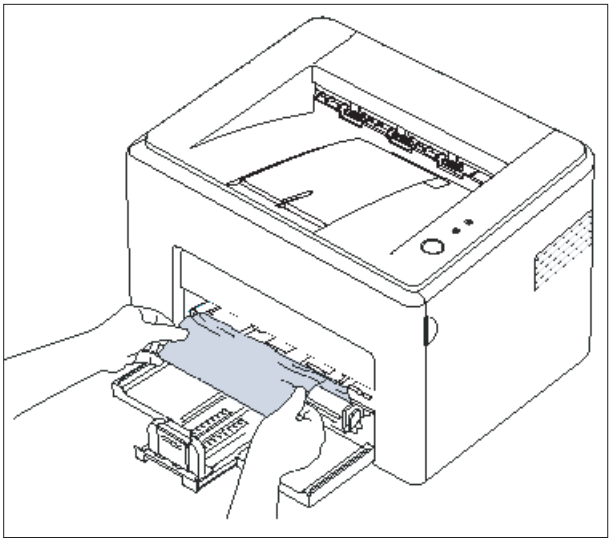


4. Close the inner cover and the top cover. Printing resumes automatically.



4.1.6.3 In the Paper Feed Area

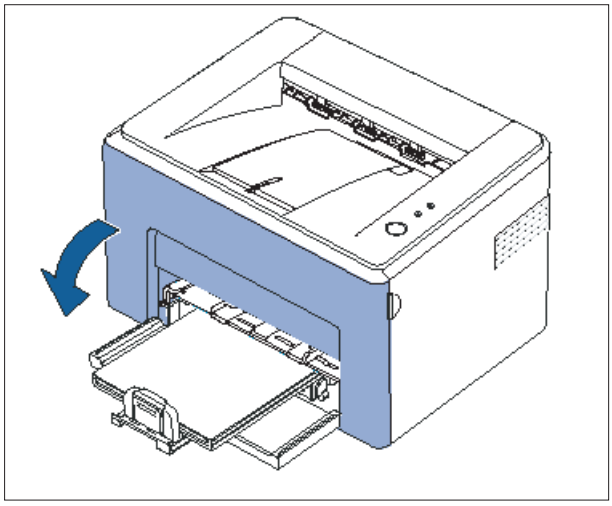
1. Remove any misfeed paper by pulling it out by the visible edge from the tray. Make sure that all of the paper is properly aligned in the tray.



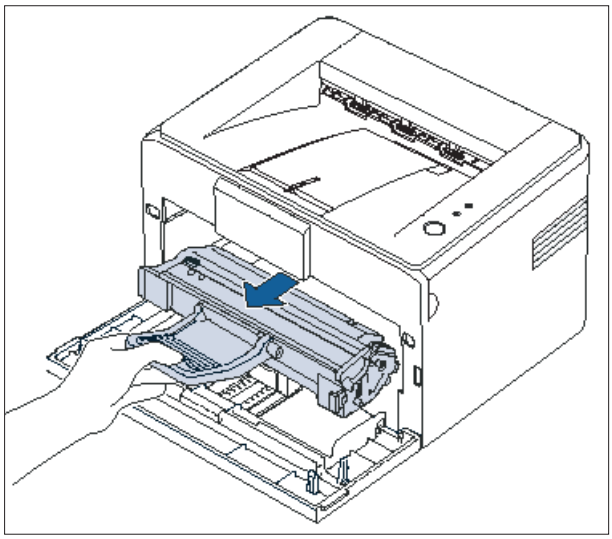
2. Open and close the front or top cover to resume printing the document from failed pages.

4.1.6.4 Around the Toner Cartridge

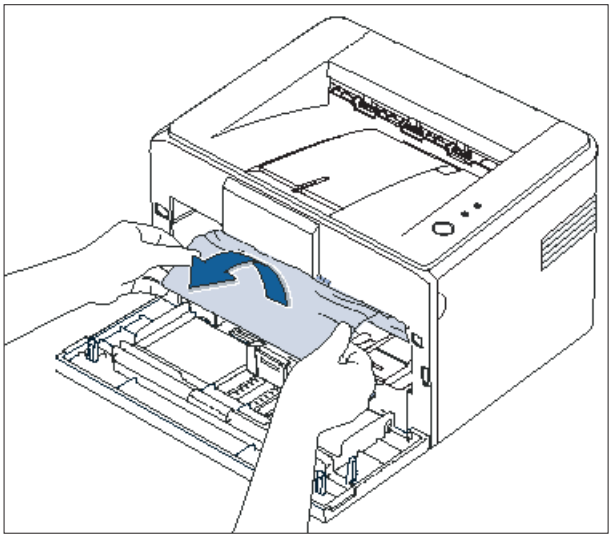
1. Open the front cover.



2. Pull the toner cartridge out and remove it from the machine.



3. Gently pull the paper toward you.



4. Check that there is no other paper in the printer.

5. Reinstall the toner cartridge, and then close the cover. Printing can be resumed.

4.1.6.5 Tips for Avoiding Paper Jams

By selecting the correct paper types, most paper jams can be avoided.

- Ensure that the adjustable guides are positioned correctly.
- Do not overload the tray.
- Do not remove the paper from the tray while printing.
- Flex, fan and straighten the paper before loading.
- Do not use creased, damp or highly curled paper.
- Do not mix paper types in the input tray.
- Use only recommended print media.
- Ensure that the recommended print side is facing up when loading paper into the input tray.

4.1.6.6 Solving Print Quality Problems

Print Quality Checklist

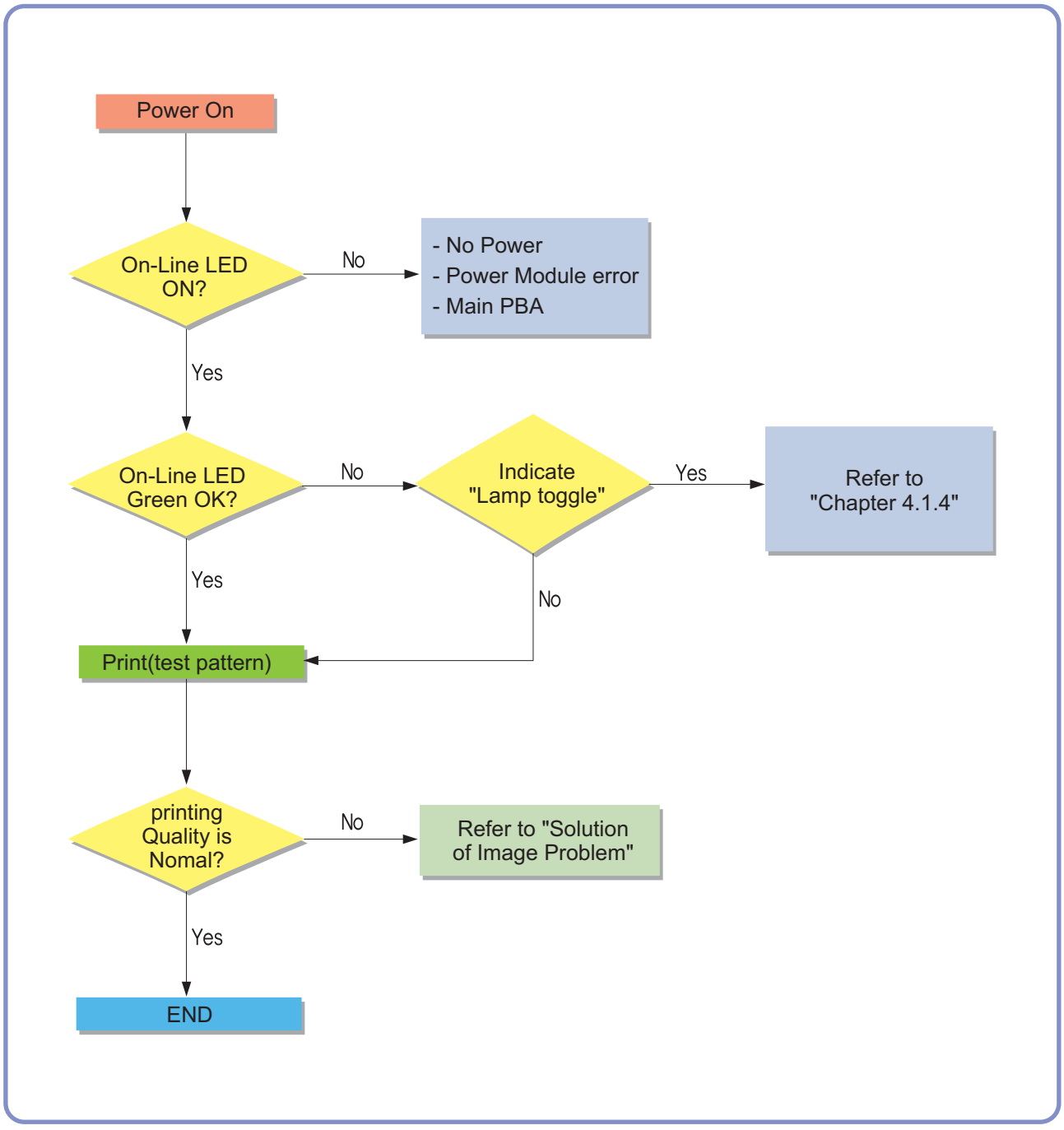
Print quality problems can be resolved by following the checklist below.

- Redistribute toner in the toner cartridge
- Clean the inside of the printer
- Adjust the print resolution from the printer properties
- Ensure that the Toner Save mode is off
- Clear general printing problems
- Install a new toner cartridge, and check the print quality

4.2 Troubleshooting

4.2.1 Checking Symptoms

Before attempting to repair the printer first obtain a detailed description of the problem from the customer.



4.2.1.1 Basic Check List

1. Check the Power.

• Does "Warming Up" appear on the display?
--> If not check power cable, switch or SMPS.
--> Does the wall socket work?
• Do the Motors or other components initialize (listen for main motor, fan and LSU sounds)?
--> If not or there are none of the normal startup sounds check cable, switch or SMPS.
--> Does the wall socket work?

2. Check the LED of Panel.

• Is there On-Line LED ON?
--> If not check power cable, switch SMPS or Main board.
--> Does the wall socket work?
• Is the abnormal Lamp?
--> Check the main PBA and cable harness.

3. Check the Paper Path

• Is there a Paper Jam?
--> Remove any paper fragments caught in the paper path.
• Paper Jam occurs repeatedly at a specific point in the Paper Path
--> Open the fuser cover, Jam clear.
--> Dismantle the machine and carefully inspect the region where the jam occurs.
(Especially, check if paper fragments are caught in the Fuser

4. Print the Information Page (Configuration).

• Try printing a test page from a computer.
--> If there is an error check cables and driver installation.

5. Check the Print Quality.

•Is there are a Print Quality Problem?
--> Refer to section 4.2.5 (Page 6-17).

6. Check consumables (toner etc.).

•Using the keys print the Test Pattern.
--> Expected life of various consumable parts, compare this with the figures printed and replace as required

4.2.1.2 Initial Inspection

1. Check Power part

1. The printer does not work no matter how long you wait.
   A. Is the Power Switch (printer and wall socket) turned on ?
   B. Is the Power Cord connected to the printer correctly ?
   C. Is the Power cord connected to the wall socket correctly ?
   D. Is wall socket working ?
   E. Is the unit rated at the same voltage as the supply ?
2. Does the Fan work when power is turned on?
   A. Check the connectors on the SMPS.
   B. Check the fuses in the SMPS.(F1)

2. Check the Installation Environment.

1. Ensure the installation surface is flat, level and free from vibration.
   If necessary move the printer.
2. Ensure that the temperature and humidity of the surroundings are within specification
   If necessary move the printer.
3. Ensure that the printer is position away from any air conditioning or other heating or cooling equipment. Also ensure that is not positioned in a direct draft from any air conditioning, fan or open window.
   If necessary move the printer.
4. Ensure the printer is not positioned in direct sunlight.
   If it is unavoidable use a curtain to shade the printer.
5. Ensure the printer is installed in a clean dust free environment.
   Move the printer to clean area if necessary.
6. Some industrial or cleaning processes give of fumes which can affect the printer.
   Move the printer away from this type of air pollution

3. Check paper type.

1. Use only paper which is of a suitable quality, weight and size?
   See the user guide.

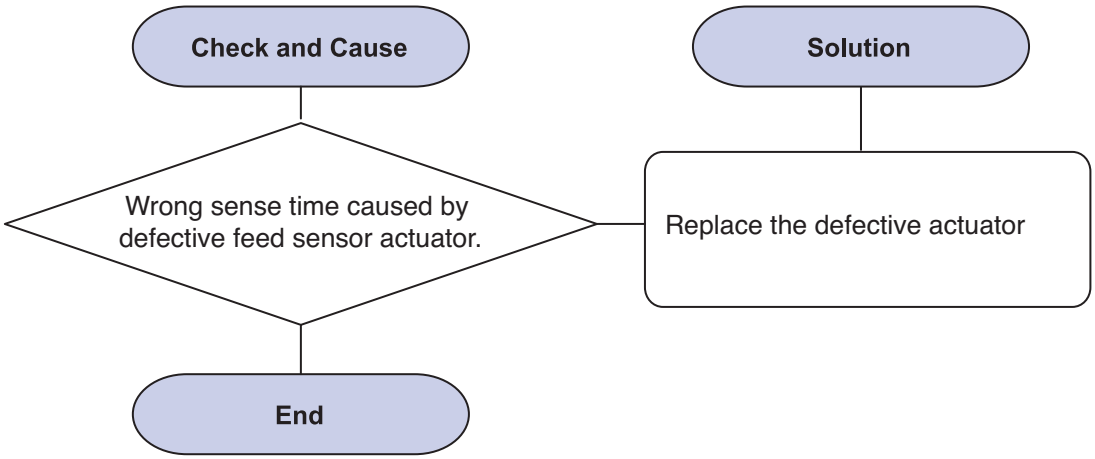
4. Check the overall condition of the printer

1. Is the printer properly maintained ?
   Clean the Paper Transport Passages.
   Any rollers with dirt surfaces should be cleaned or replaced.

4.2.2 Bad discharge

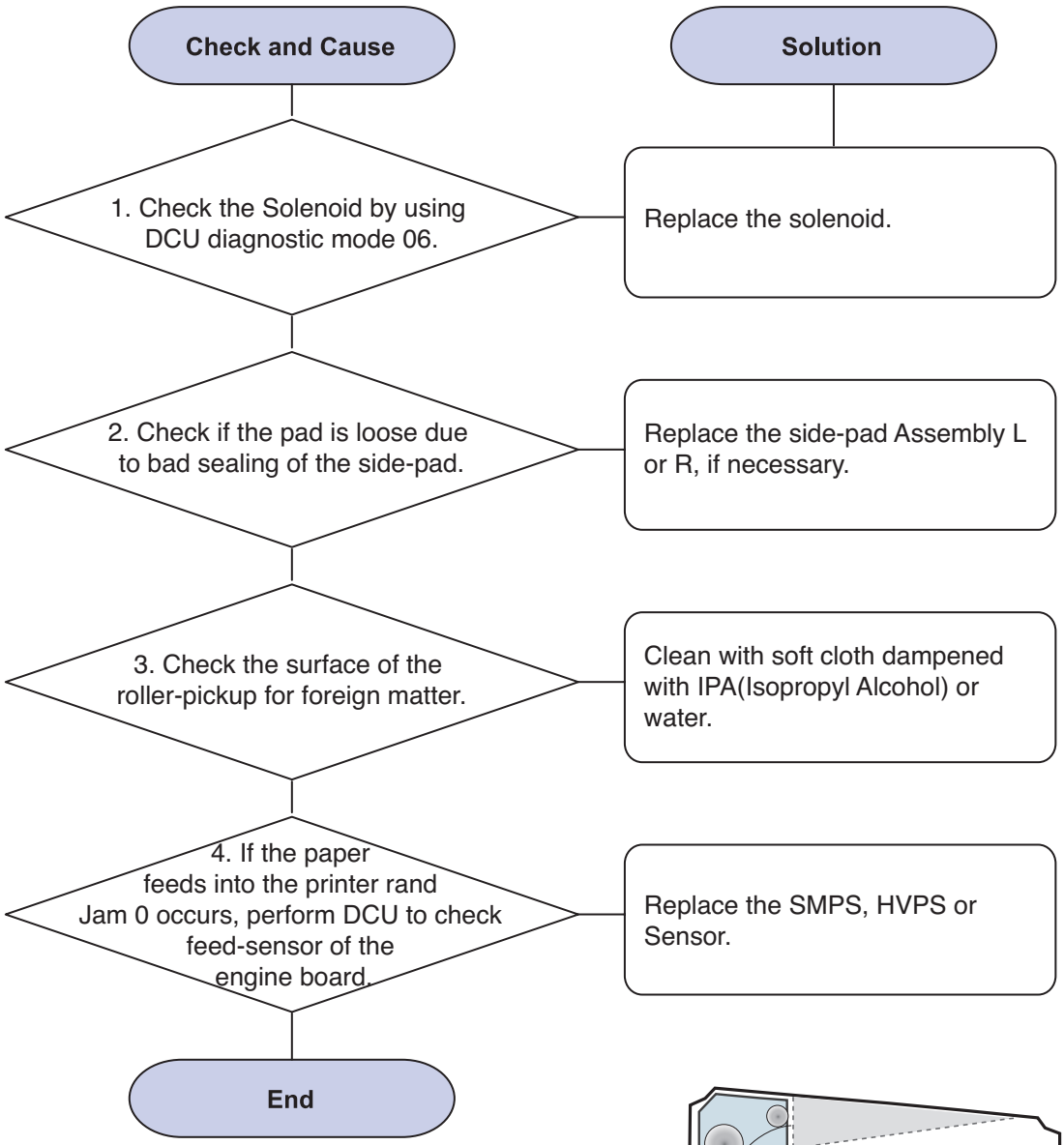
1) Wrong Print Position

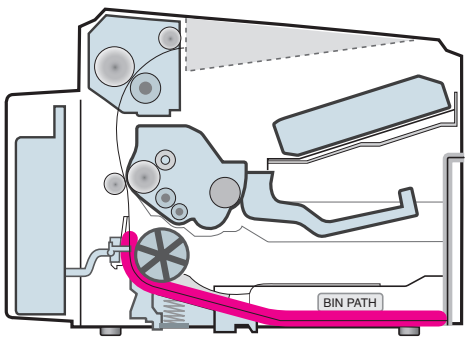
• **Description** Printing begins at wrong position on the paper.



2) JAM 0

• **Description** 1. Paper is not exited from the cassette.
2. Jam-0 occurs if the paper feeds into the printer.

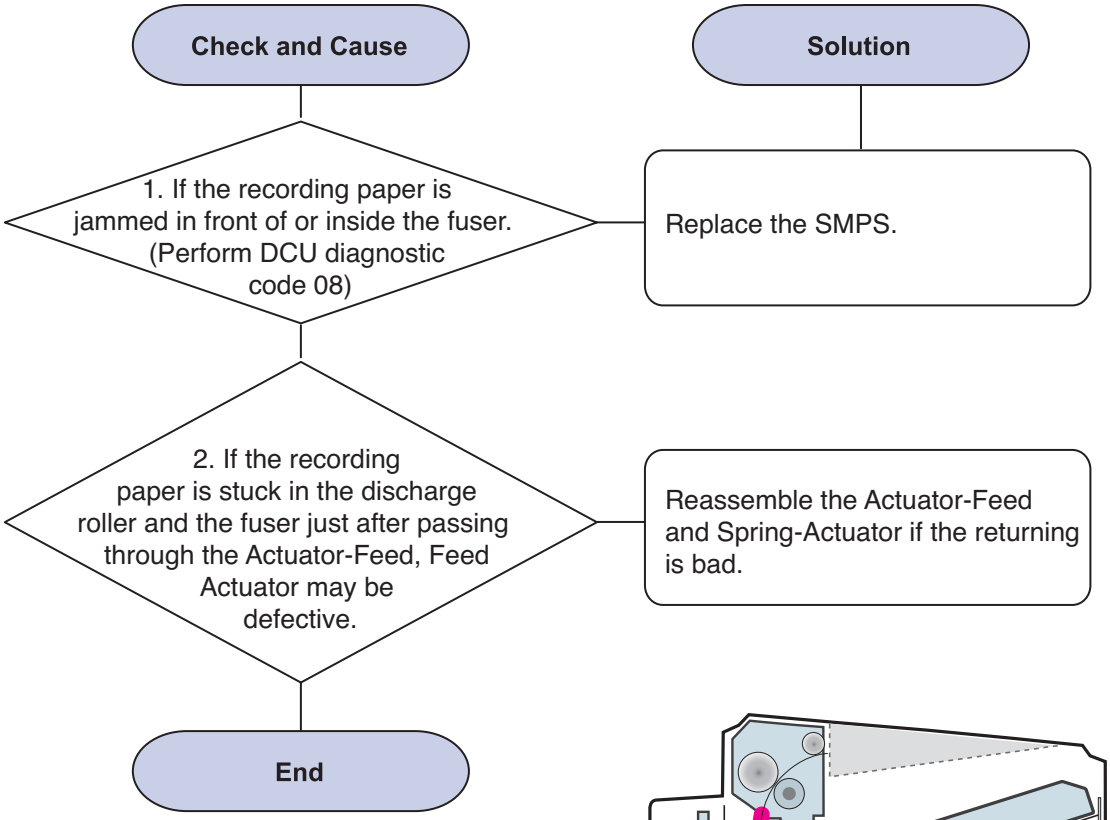

Check and Cause
Solution
1. Check the Solenoid by using DCU diagnostic mode 06.
Replace the solenoid.
2. Check if the pad is loose due to bad sealing of the side-pad.
Replace the side-pad Assembly L or R, if necessary.
3. Check the surface of the roller-pickup for foreign matter.
Clean with soft cloth dampened with IPA(Isopropyl Alcohol) or water.
4. If the paper feeds into the printer rand Jam 0 occurs, perform DCU to check feed-sensor of the engine board.
Replace the SMPS, HVPS or Sensor.
End



3) JAM 1

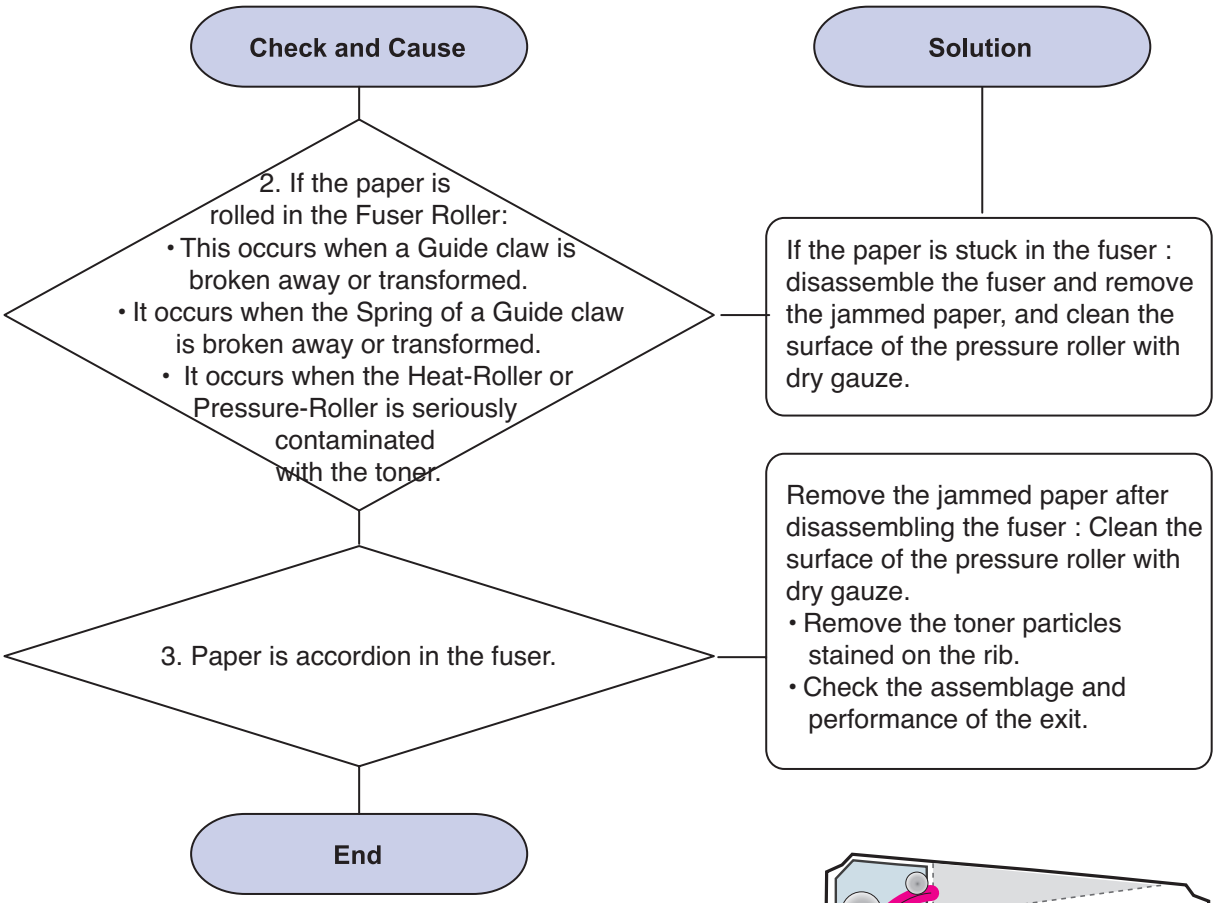
• **Description**

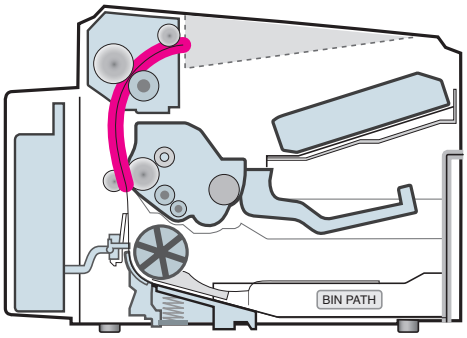
1. Recording paper is jammed in front of or inside the fuser.
2. Recording paper is stuck in the discharge roller and in the fuser just after passing through the Actuator-Feed.


Check and Cause
Solution
1. If the recording paper is jammed in front of or inside the fuser. (Perform DCU diagnostic code 08)
Replace the SMPS.
2. If the recording paper is stuck in the discharge roller and the fuser just after passing through the Actuator-Feed, Feed Actuator may be defective.
Reassemble the Actuator-Feed and Spring-Actuator if the returning is bad.
End
BIN PATH

4) JAM 2

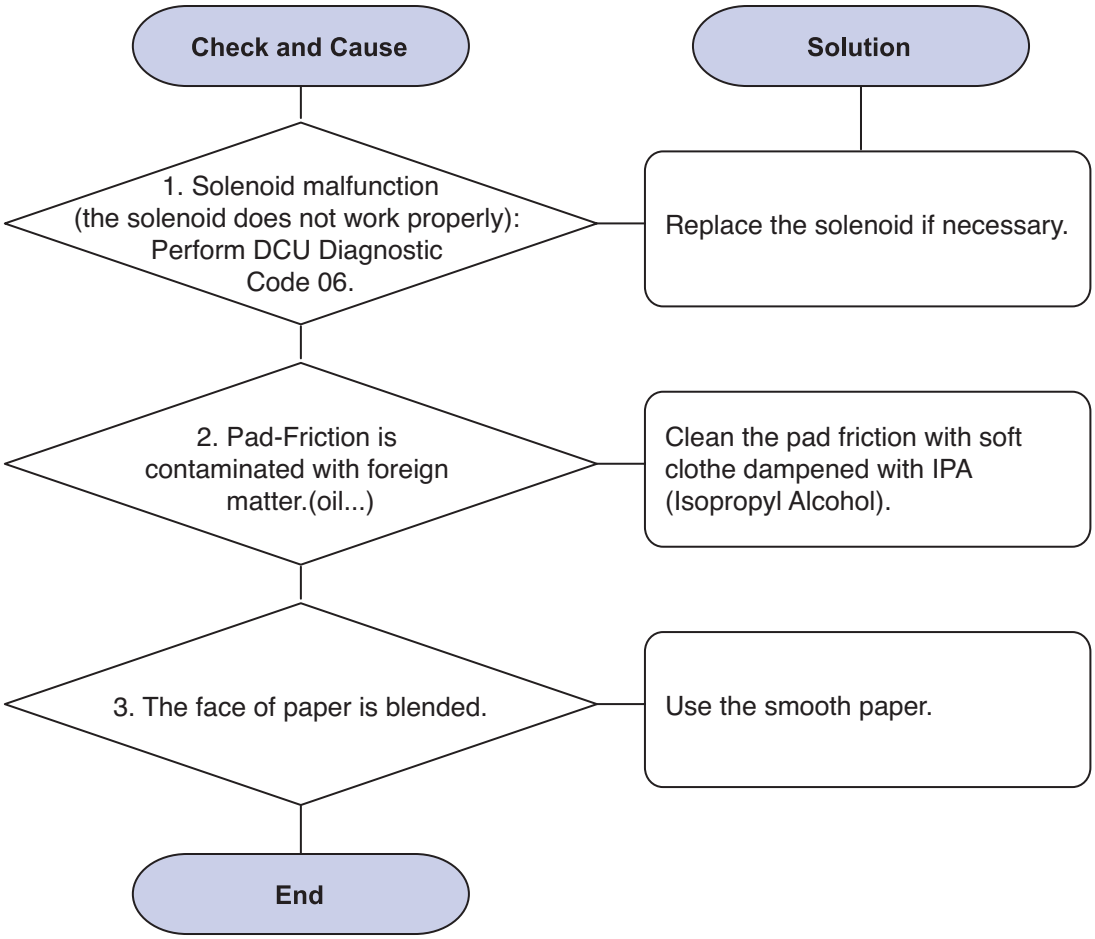
• **Description**
1. Recording paper is jammed in front of or inside the fuser.
2. Recording paper is stuck in the discharge roller and in the fuser just after passing through the Actuator-Feed.


Check and Cause
Solution
2. If the paper is rolled in the Fuser Roller:
• This occurs when a Guide claw is broken away or transformed.
• It occurs when the Spring of a Guide claw is broken away or transformed.
• It occurs when the Heat-Roller or Pressure-Roller is seriously contaminated with the toner.
If the paper is stuck in the fuser : disassemble the fuser and remove the jammed paper, and clean the surface of the pressure roller with dry gauze.
3. Paper is accordion in the fuser.
Remove the jammed paper after disassembling the fuser : Clean the surface of the pressure roller with dry gauze.
• Remove the toner particles stained on the rib.
• Check the assemblage and performance of the exit.
End



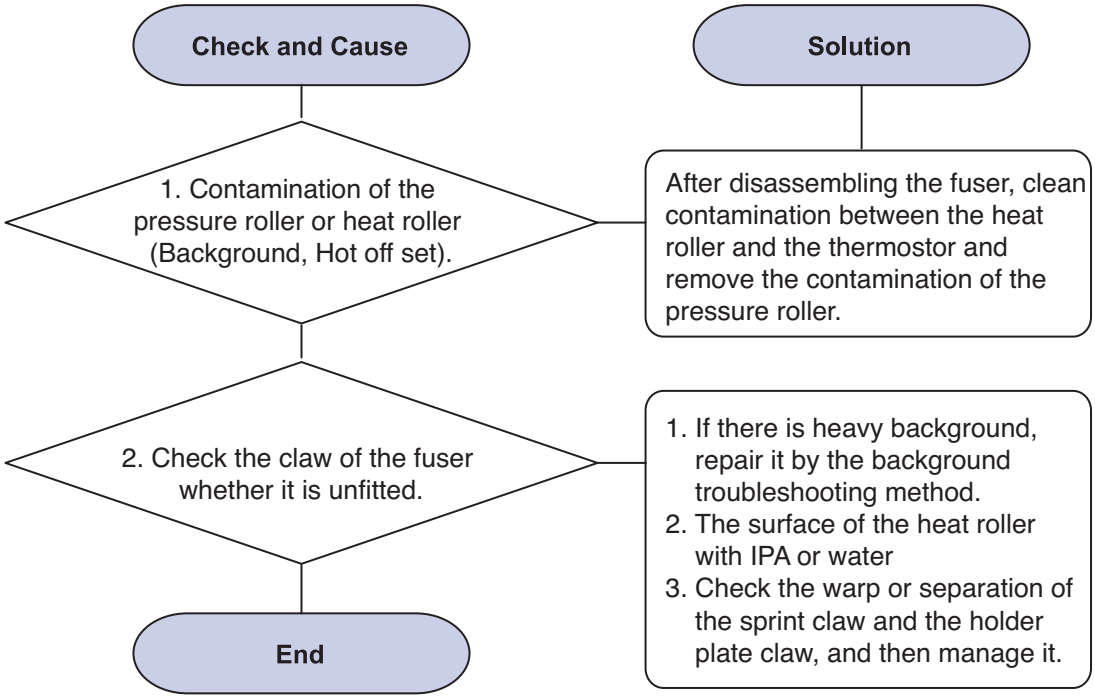
5) Multi-Feeding

• **Description** Multiple sheets of paper are fed at once.


Check and Cause
Solution
1. Solenoid malfunction (the solenoid does not work properly): Perform DCU Diagnostic Code 06.
Replace the solenoid if necessary.
2. Pad-Friction is contaminated with foreign matter.(oil...)
Clean the pad friction with soft clothe dampened with IPA (Isopropyl Alcohol).
3. The face of paper is blended.
Use the smooth paper.
End

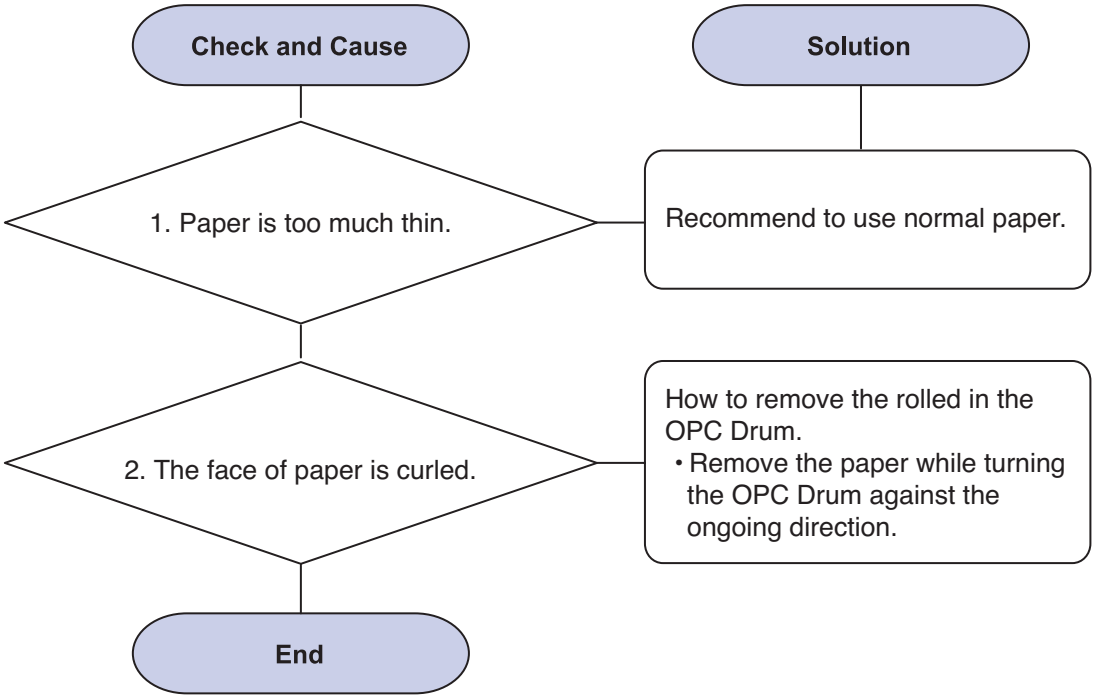
6) Paper rolled in the Fuser

• **Description** If contaminated at intervals of 57mm on the back of a paper.


Check and Cause
Solution
1. Contamination of the pressure roller or heat roller (Background, Hot off set).
After disassembling the fuser, clean contamination between the heat roller and the thermostor and remove the contamination of the pressure roller.
2. Check the claw of the fuser whether it is unfitted.
1. If there is heavy background, repair it by the background troubleshooting method.
2. The surface of the heat roller with IPA or water
3. Check the warp or separation of the sprint claw and the holder plate claw, and then manage it.
End

7) Paper rolled in the Toner Cartridge (OPC Drum)

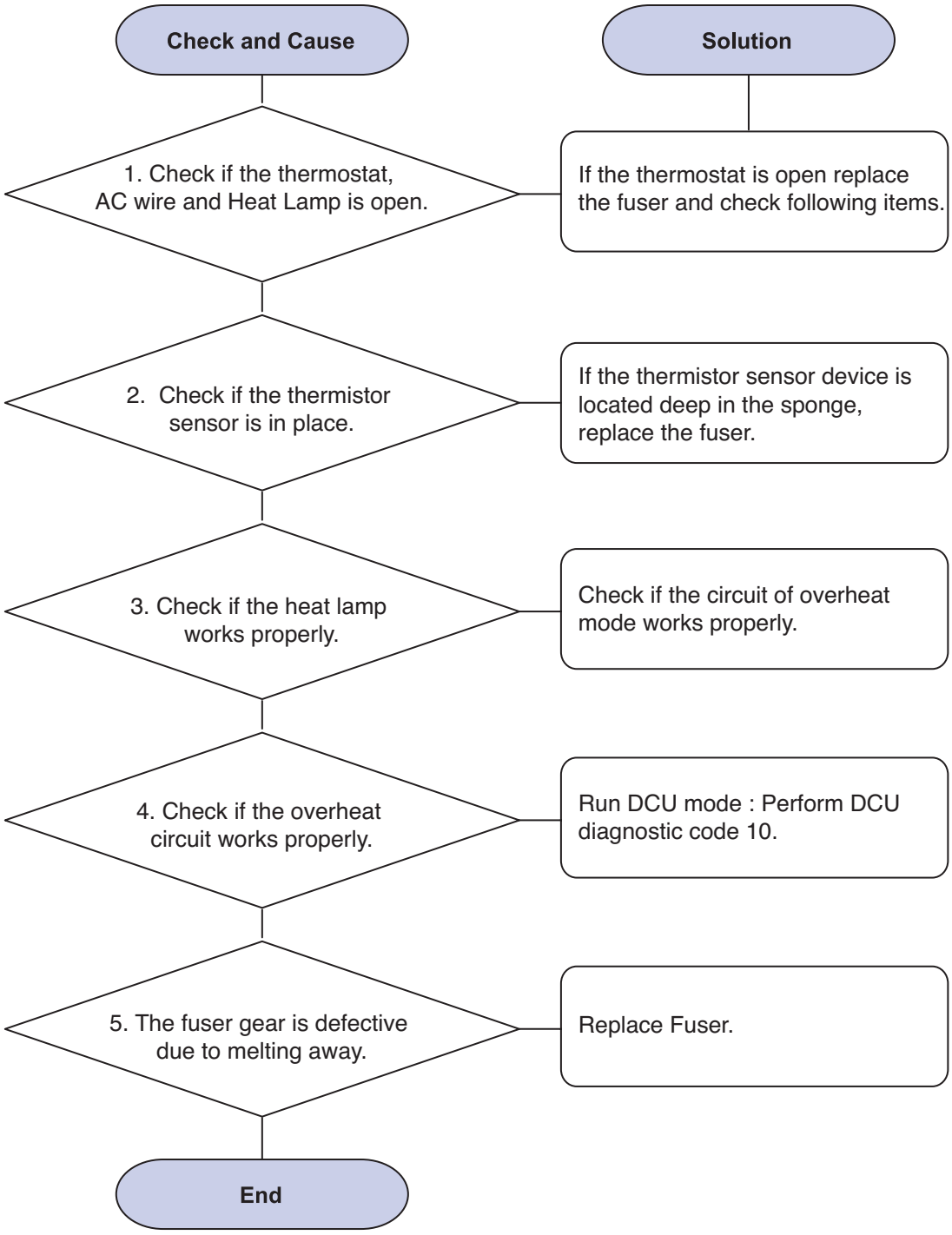
• **Description** Paper is rolled up in the OPC.


Check and Cause
Solution
1. Paper is too much thin.
Recommend to use normal paper.
2. The face of paper is curled.
How to remove the rolled in the OPC Drum.
• Remove the paper while turning the OPC Drum against the ongoing direction.
End

4.2.3 Malfunction

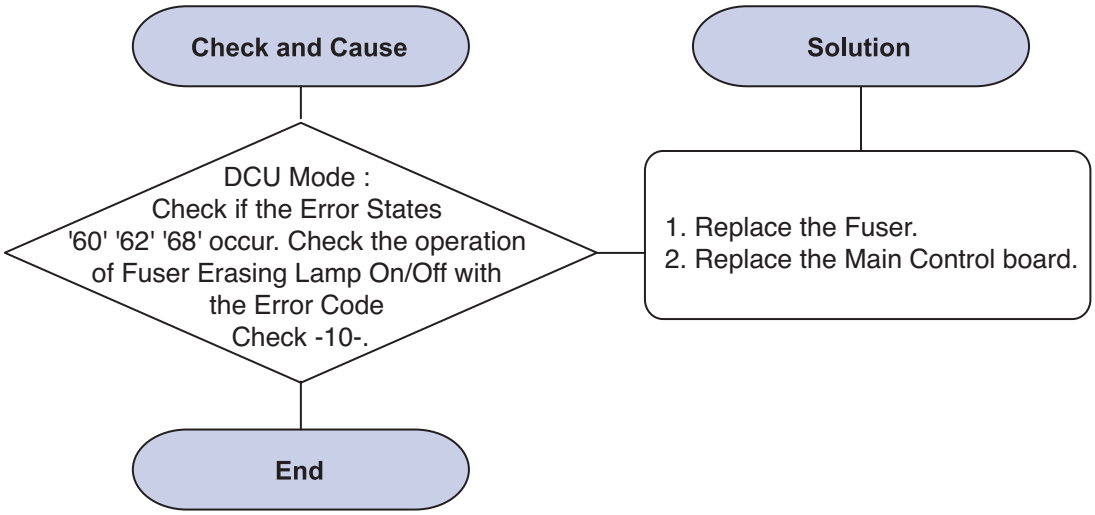
1) Red LED on (On line/Error LED) (Fuser Error)

• **Description**
1. Red LED on (On line/Error LED)
2. Gear of the fuser does not work and breaks away melt away.
When printing, motor breaks away from its place due to defective fuser gear.


Check and Cause
Solution
1. Check if the thermostat, AC wire and Heat Lamp is open.
If the thermostat is open replace the fuser and check following items.
2. Check if the thermistor sensor is in place.
If the thermistor sensor device is located deep in the sponge, replace the fuser.
3. Check if the heat lamp works properly.
Check if the circuit of overheat mode works properly.
4. Check if the overheat circuit works properly.
Run DCU mode : Perform DCU diagnostic code 10.
5. The fuser gear is defective due to melting away.
Replace Fuser.
End

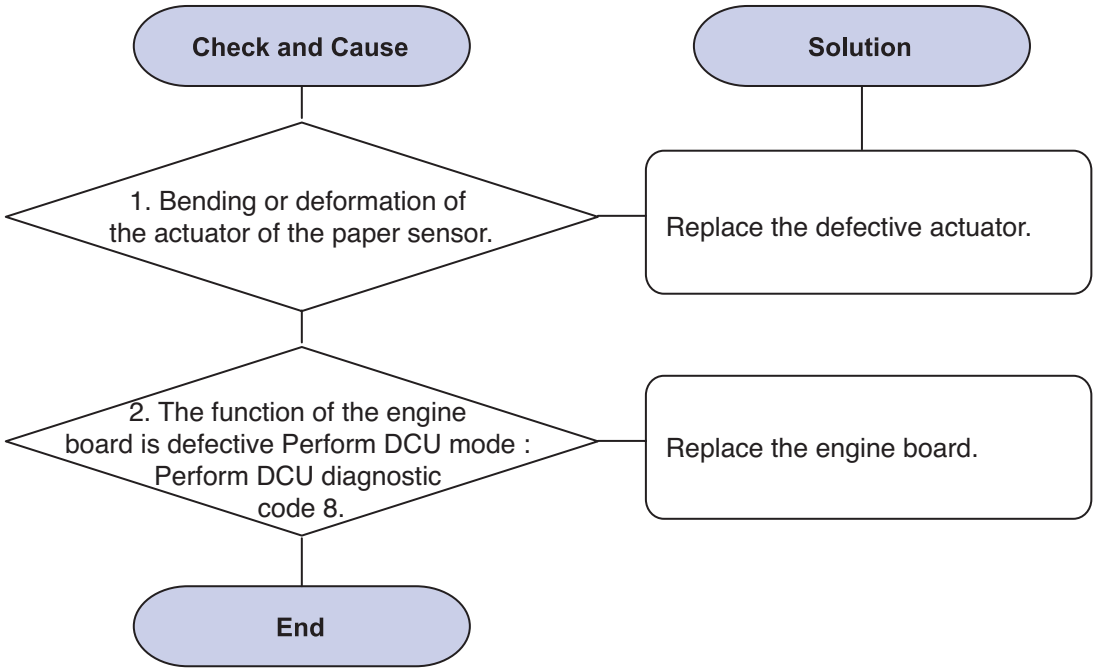
2) Not function of the gear of the fuser due to melting away

• **Description** The motor breaks away from its place due to gear melting away.



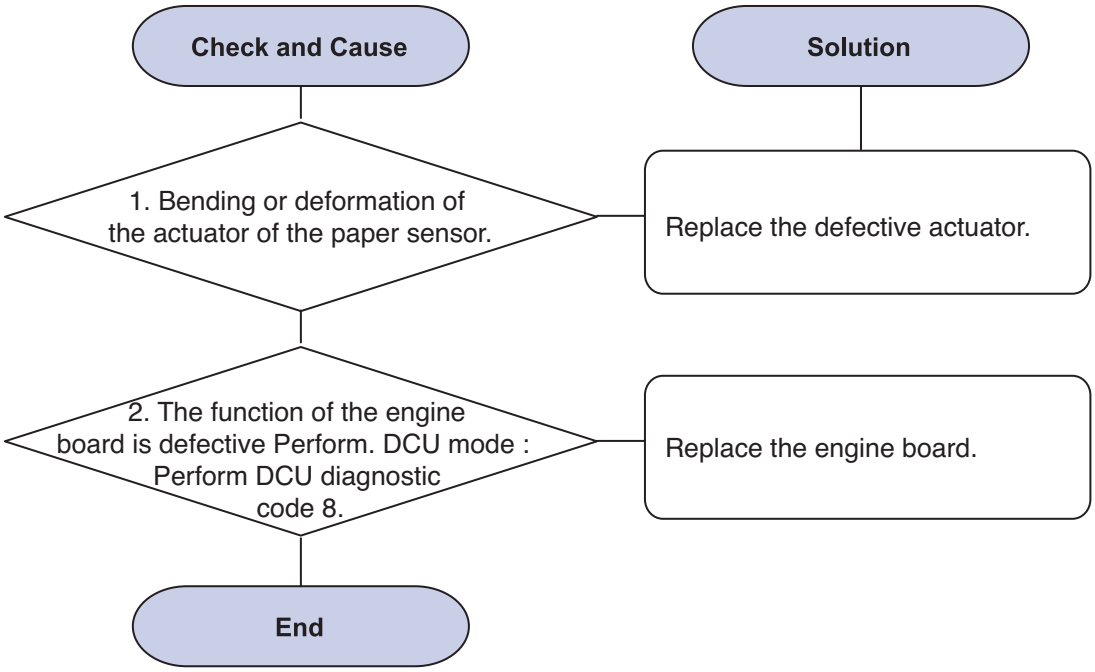
3) Paper Empty

• **Description** The paper lamp on the operator panel is on even when paper is loaded in the cassette.


Check and Cause
Solution
1. Bending or deformation of the actuator of the paper sensor.
Replace the defective actuator.
2. The function of the engine board is defective Perform DCU mode : Perform DCU diagnostic code 8.
Replace the engine board.
End

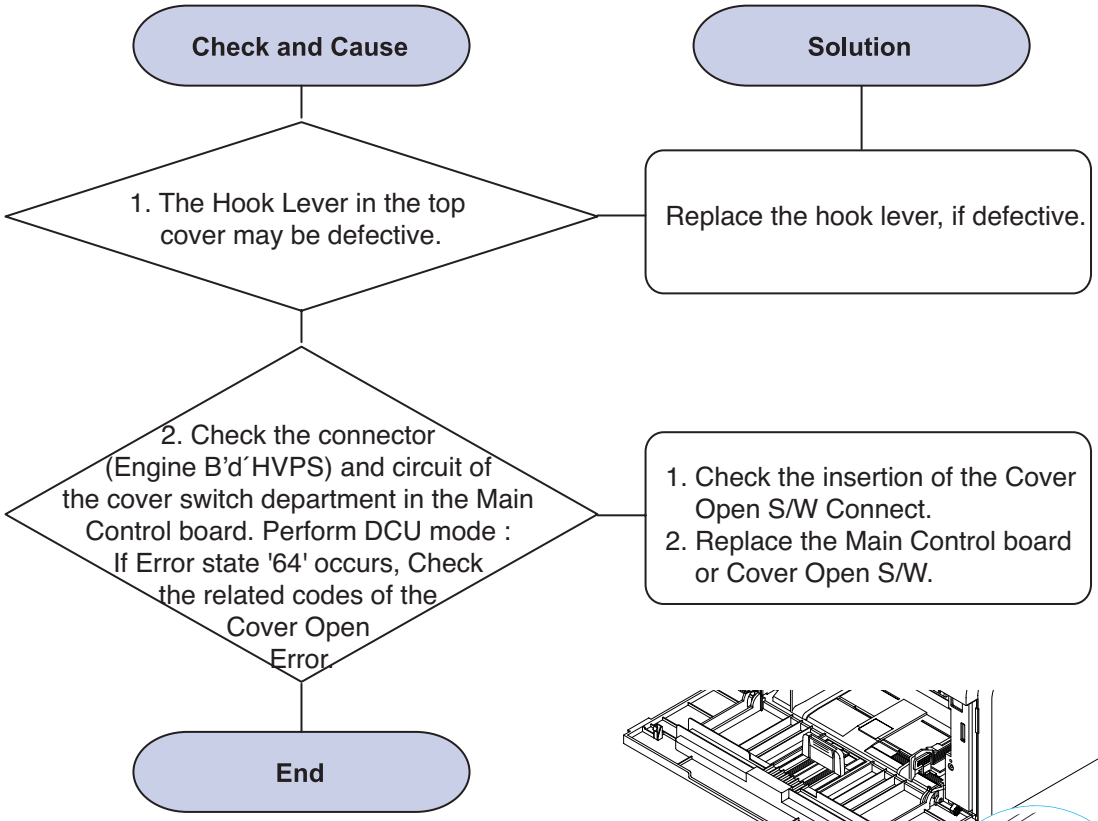
4) Paper Empty without indication

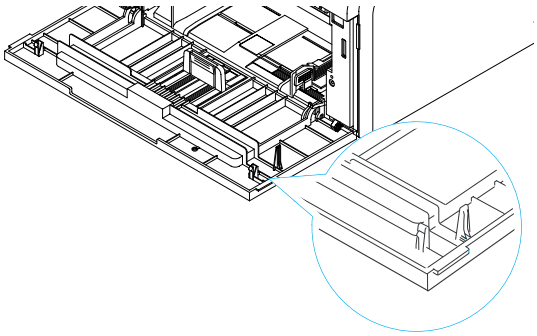
• **Description** The paper lamp on the operator panel does not come on when the paper cassette is empty.


Check and Cause
Solution
1. Bending or deformation of the actuator of the paper sensor.
Replace the defective actuator.
2. The function of the engine board is defective Perform. DCU mode : Perform DCU diagnostic code 8.
Replace the engine board.
End

5) Cover Open

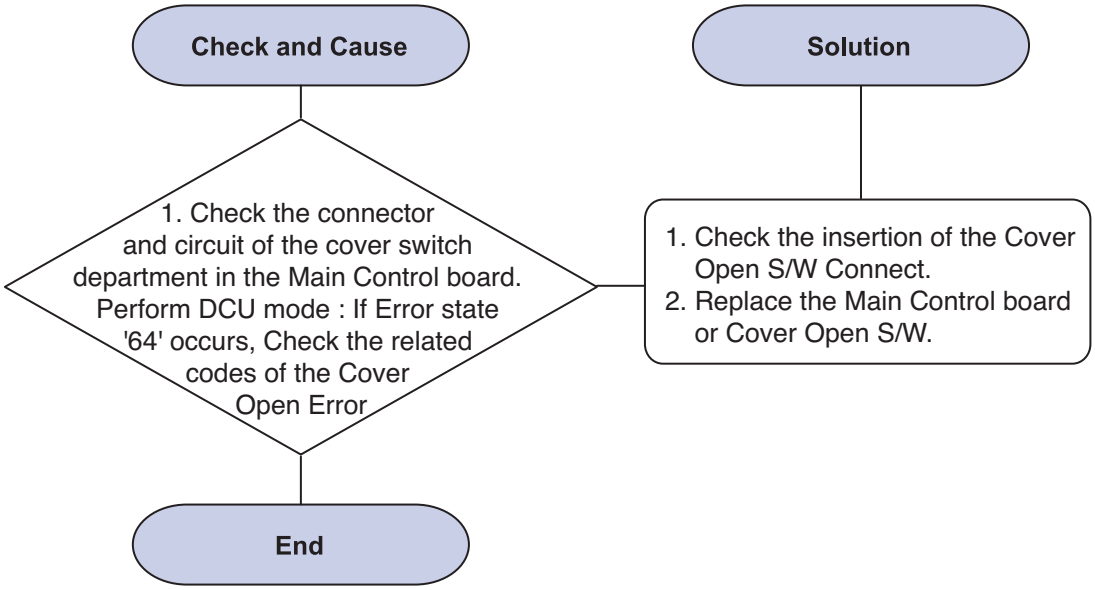
• **Description** The ERROR lamp is on even when the print cover is closed.


Check and Cause
Solution
1. The Hook Lever in the top cover may be defective.
Replace the hook lever, if defective.
2. Check the connector (Engine B'd´HVPS) and circuit of the cover switch department in the Main Control board. Perform DCU mode : If Error state '64' occurs, Check the related codes of the Cover Open Error.
1. Check the insertion of the Cover Open S/W Connect.
2. Replace the Main Control board or Cover Open S/W.
End



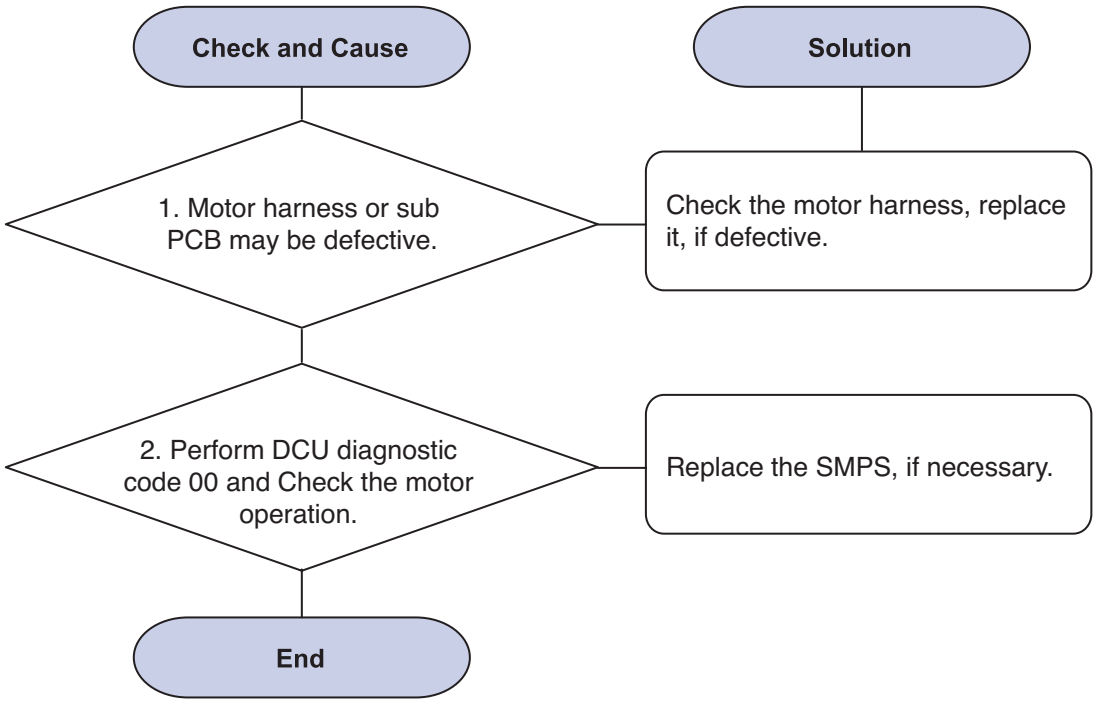
6) No lamp on when the cover is open

• **Description** The ERROR lamp does not come on even when the printer cover is open


Check and Cause
Solution
1. Check the connector and circuit of the cover switch department in the Main Control board. Perform DCU mode : If Error state '64' occurs, Check the related codes of the Cover Open Error
1. Check the insertion of the Cover Open S/W Connect.
2. Replace the Main Control board or Cover Open S/W.
End

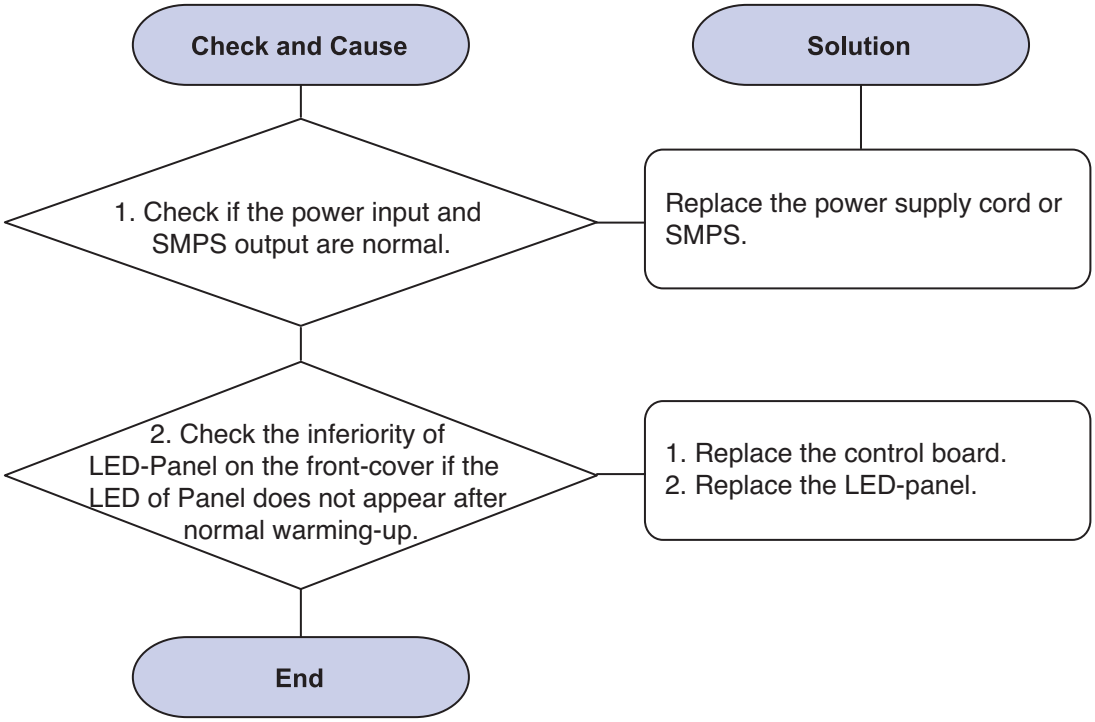
7) Defective motor operation

• **Description** Main motor is not driving when printing, and paper does not feed into the printer, resulting 'Jam 0'.


Check and Cause
Solution
1. Motor harness or sub PCB may be defective.
Check the motor harness, replace it, if defective.
2. Perform DCU diagnostic code 00 and Check the motor operation.
Replace the SMPS, if necessary.
End

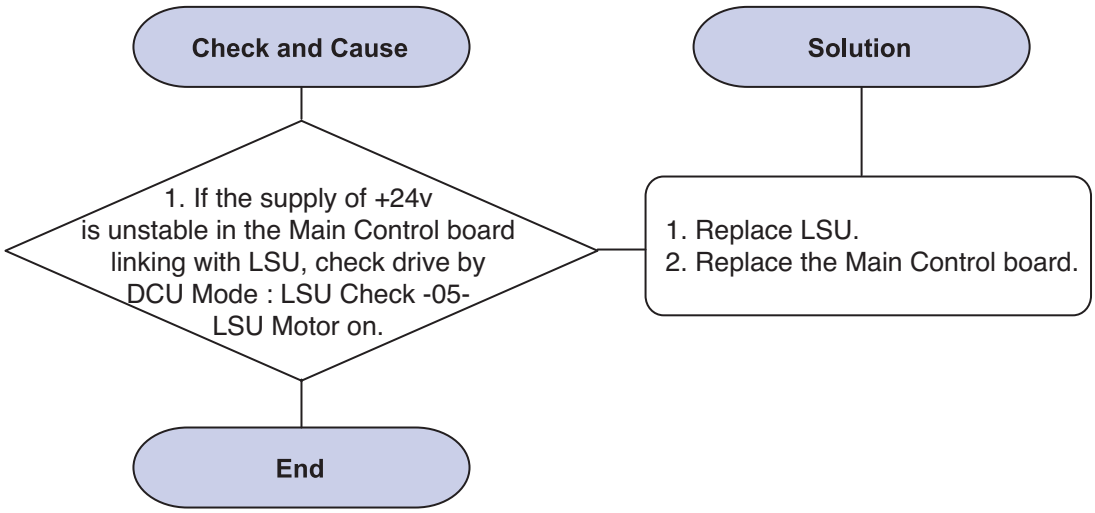
8) No Power

• **Description** When system power is turned on, all lamps on the operator panel do not come on.


Check and Cause
Solution
1. Check if the power input and SMPS output are normal.
Replace the power supply cord or SMPS.
2. Check the inferiority of LED-Panel on the front-cover if the LED of Panel does not appear after normal warming-up.
1. Replace the control board.
2. Replace the LED-panel.
End

9) Vertical Line Getting Curved

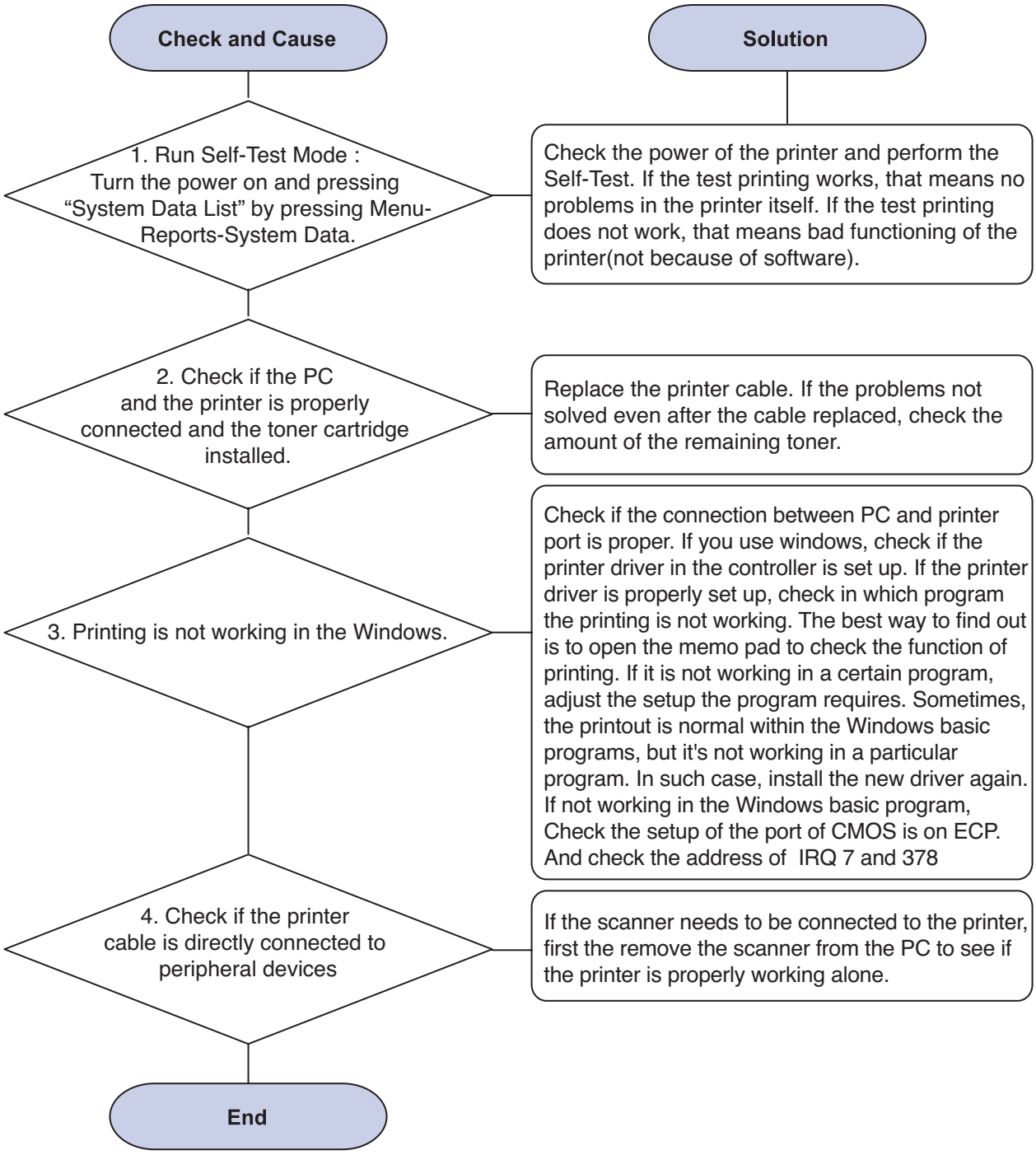
• **Description** When printing, vertical line gets curved.


Check and Cause
Solution
1. If the supply of +24v is unstable in the Main Control board linking with LSU, check drive by DCU Mode : LSU Check -05- LSU Motor on.
1. Replace LSU.
2. Replace the Main Control board.
End

4.2.4 Bad Software Environment

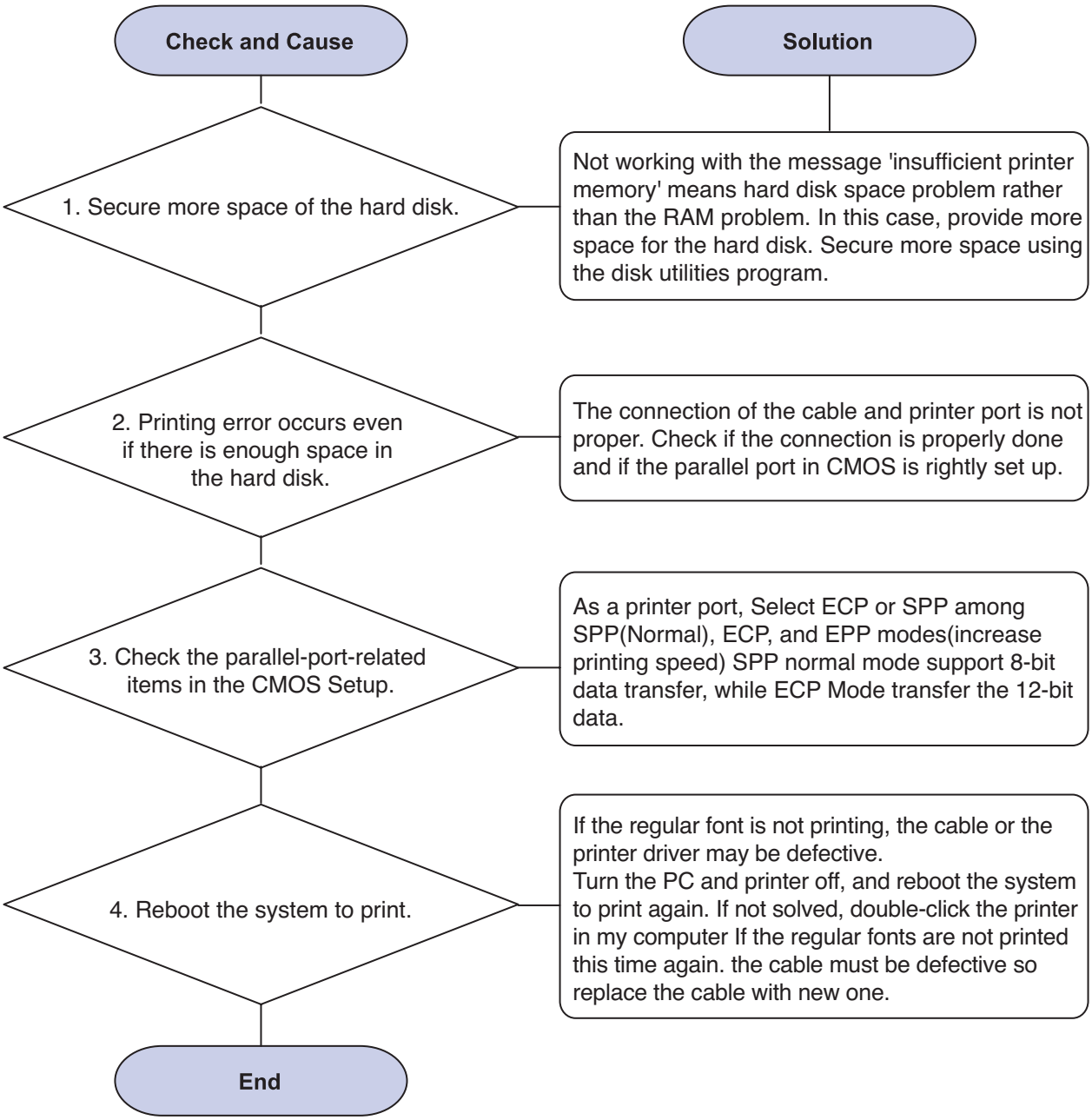
1) The printer is not working (1)

• **Description** While Power turned on, the printer is not working in the printing mode.


Check and Cause
Solution
1. Run Self-Test Mode : Turn the power on and pressing "System Data List" by pressing Menu-Reports-System Data.
Check the power of the printer and perform the Self-Test. If the test printing works, that means no problems in the printer itself. If the test printing does not work, that means bad functioning of the printer(not because of software).
2. Check if the PC and the printer is properly connected and the toner cartridge installed.
Replace the printer cable. If the problems not solved even after the cable replaced, check the amount of the remaining toner.
3. Printing is not working in the Windows.
Check if the connection between PC and printer port is proper. If you use windows, check if the printer driver in the controller is set up. If the printer driver is properly set up, check in which program the printing is not working. The best way to find out is to open the memo pad to check the function of printing. If it is not working in a certain program, adjust the setup the program requires. Sometimes, the printout is normal within the Windows basic programs, but it's not working in a particular program. In such case, install the new driver again. If not working in the Windows basic program, Check the setup of the port of CMOS is on ECP. And check the address of IRQ 7 and 378
4. Check if the printer cable is directly connected to peripheral devices
If the scanner needs to be connected to the printer, first the remove the scanner from the PC to see if the printer is properly working alone.
End

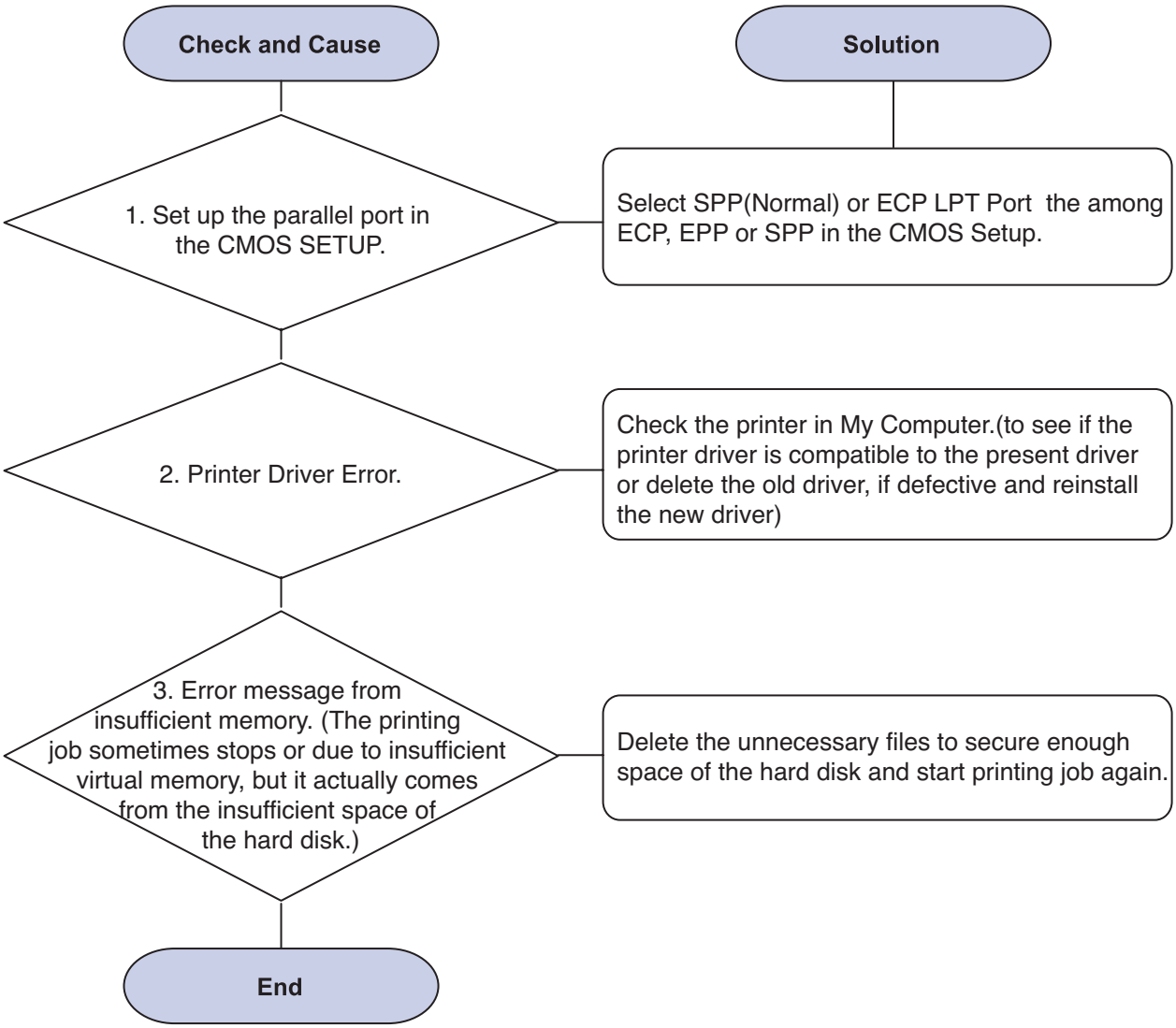
2) The printer is not working (2)

• Description After receiving the printing order, no response at all or the low speed of printing occurs due to wrong setup of the environment rather than malfunction of the printer itself.


Check and Cause
Solution
1. Secure more space of the hard disk.
Not working with the message 'insufficient printer memory' means hard disk space problem rather than the RAM problem. In this case, provide more space for the hard disk. Secure more space using the disk utilities program.
2. Printing error occurs even if there is enough space in the hard disk.
The connection of the cable and printer port is not proper. Check if the connection is properly done and if the parallel port in CMOS is rightly set up.
3. Check the parallel-port-related items in the CMOS Setup.
As a printer port, Select ECP or SPP among SPP(Normal), ECP, and EPP modes(increase printing speed) SPP normal mode support 8-bit data transfer, while ECP Mode transfer the 12-bit data.
4. Reboot the system to print.
If the regular font is not printing, the cable or the printer driver may be defective.
Turn the PC and printer off, and reboot the system to print again. If not solved, double-click the printer in my computer If the regular fonts are not printed this time again. the cable must be defective so replace the cable with new one.
End

3) Abnormal Printing

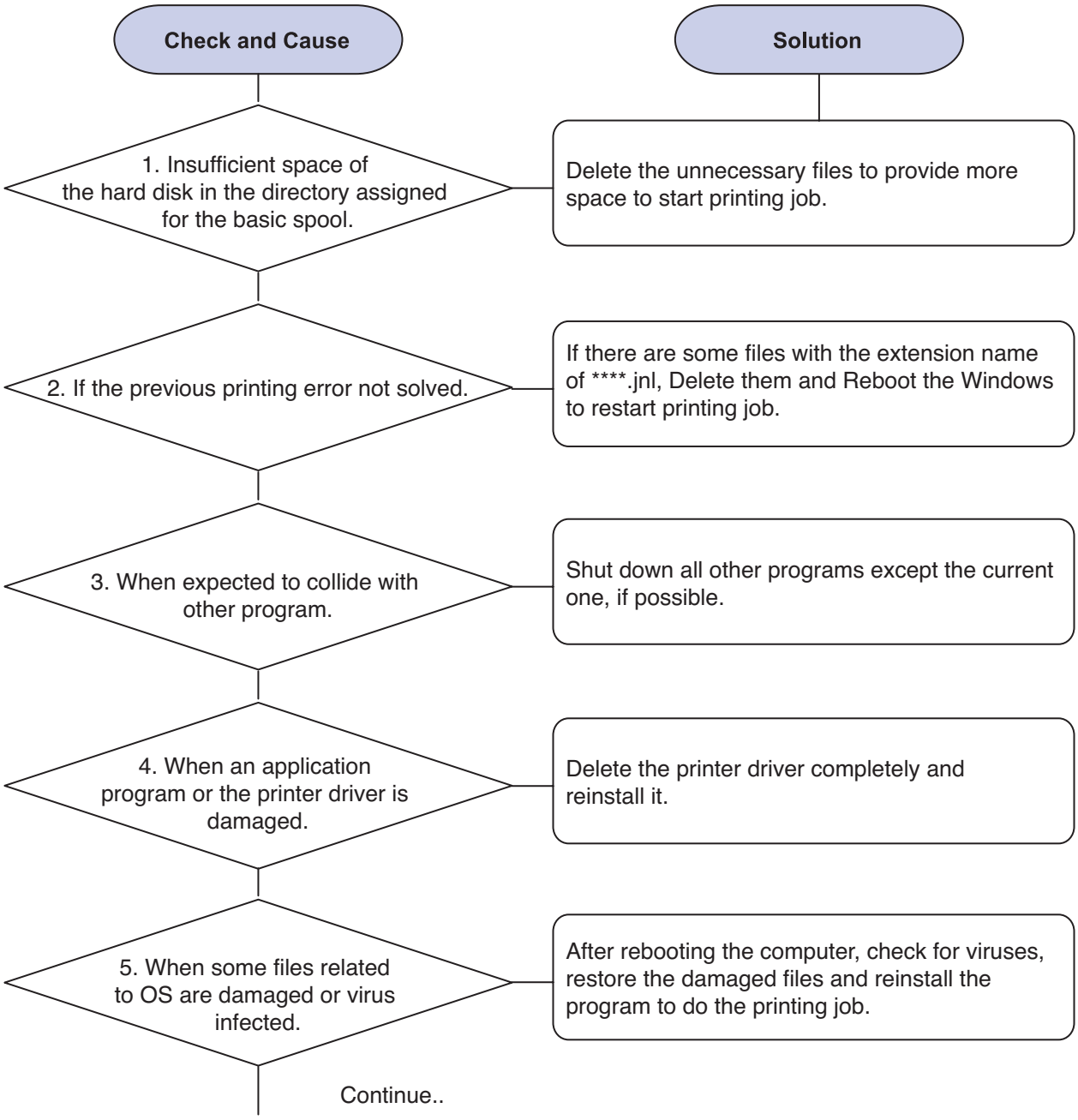
• **Description**	The printing is not working properly even when the cable has no problem. (even after the cable is replaced) If the printer won't work at all or the strange fonts are repeated, the printer driver may be defective or wrong setup in the CMOS Setup.

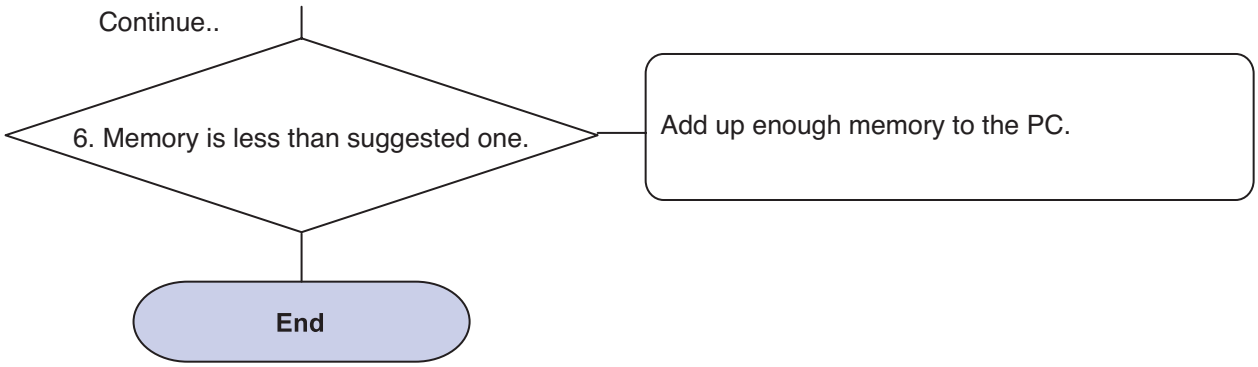

Check and Cause
Solution
1. Set up the parallel port in the CMOS SETUP.
Select SPP(Normal) or ECP LPT Port the among ECP, EPP or SPP in the CMOS Setup.
2. Printer Driver Error.
Check the printer in My Computer.(to see if the printer driver is compatible to the present driver or delete the old driver, if defective and reinstall the new driver)
3. Error message from insufficient memory. (The printing job sometimes stops or due to insufficient virtual memory, but it actually comes from the insufficient space of the hard disk.)
Delete the unnecessary files to secure enough space of the hard disk and start printing job again.
End

4) SPOOL Error

• Description

To spool which stands for "simultaneous peripheral operations online" a computer document or task list (or "job") is to read it in and store it, usually on a hard disk or larger storage medium so that it can be printed or otherwise processed at a more convenient time (for example, when a printer is finished printing its current document).


Check and Cause
Solution
1. Insufficient space of the hard disk in the directory assigned for the basic spool.
Delete the unnecessary files to provide more space to start printing job.
2. If the previous printing error not solved.
If there are some files with the extension name of ****.jnl, Delete them and Reboot the Windows to restart printing job.
3. When expected to collide with other program.
Shut down all other programs except the current one, if possible.
4. When an application program or the printer driver is damaged.
Delete the printer driver completely and reinstall it.
5. When some files related to OS are damaged or virus infected.
After rebooting the computer, check for viruses, restore the damaged files and reinstall the program to do the printing job.
Continue..



⚠ How to delete the data in the spool manager.

In the spool manager, the installed drivers and the list of the documents waiting to be printed are shown. Select the document to be deleted and check the delete menu.

If you intend to delete the current document being printed, the data being transferred to the printer will be put out and then the document is removed. Before choosing the document, the menu is still inactive.

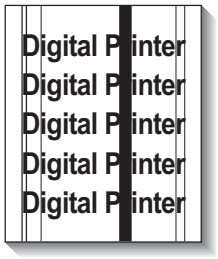
Or put the document out of the list and repeat the routine as in the above or finish the spool manager.

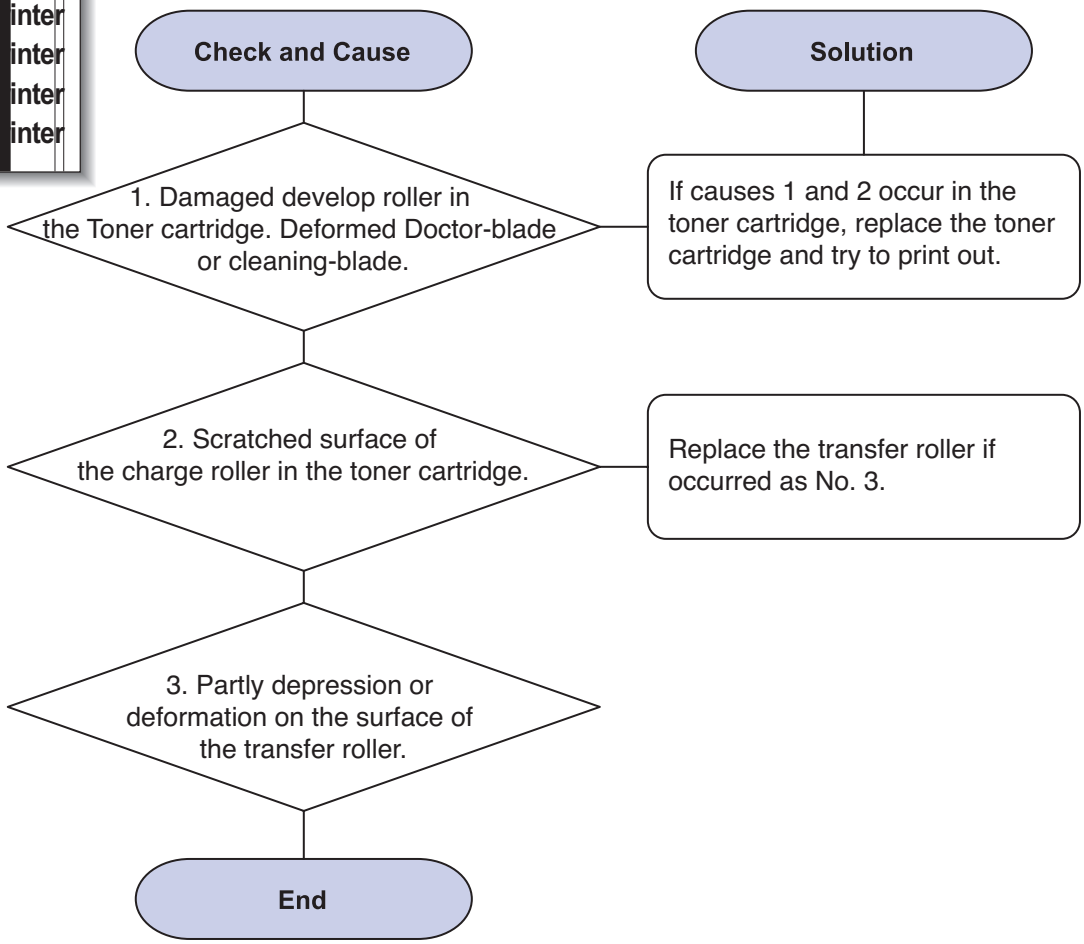
4.2.5 Bad image

1) Vertical Black Line and Band

• Description

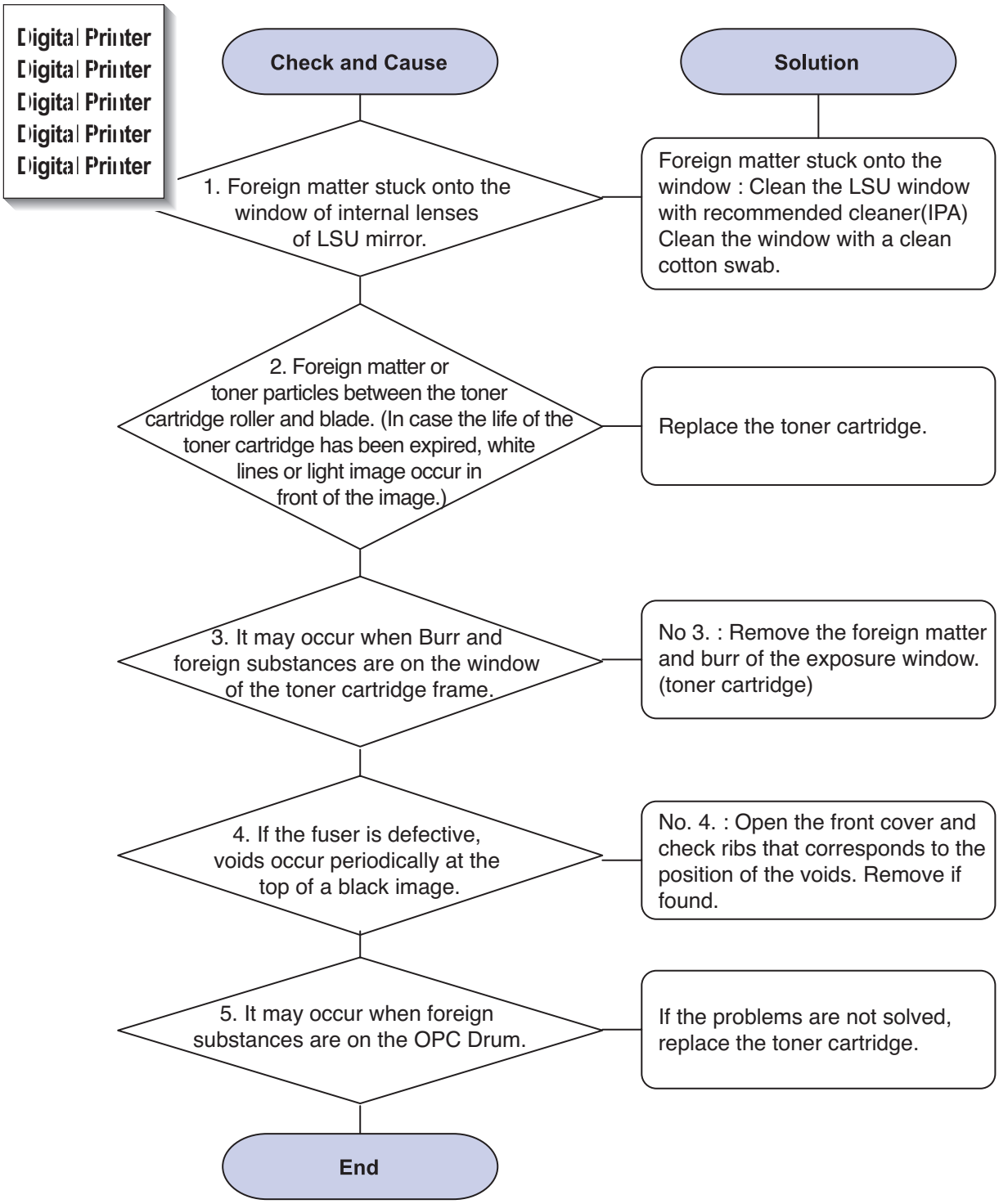
1. Straight thin black vertical lines are shown in the print-out.
2. Dark black vertical bands are shown in the print-out.




Check and Cause
Solution
1. Damaged develop roller in the Toner cartridge. Deformed Doctor-blade or cleaning-blade.
If causes 1 and 2 occur in the toner cartridge, replace the toner cartridge and try to print out.
2. Scratched surface of the charge roller in the toner cartridge.
Replace the transfer roller if occurred as No. 3.
3. Partly depression or deformation on the surface of the transfer roller.
End

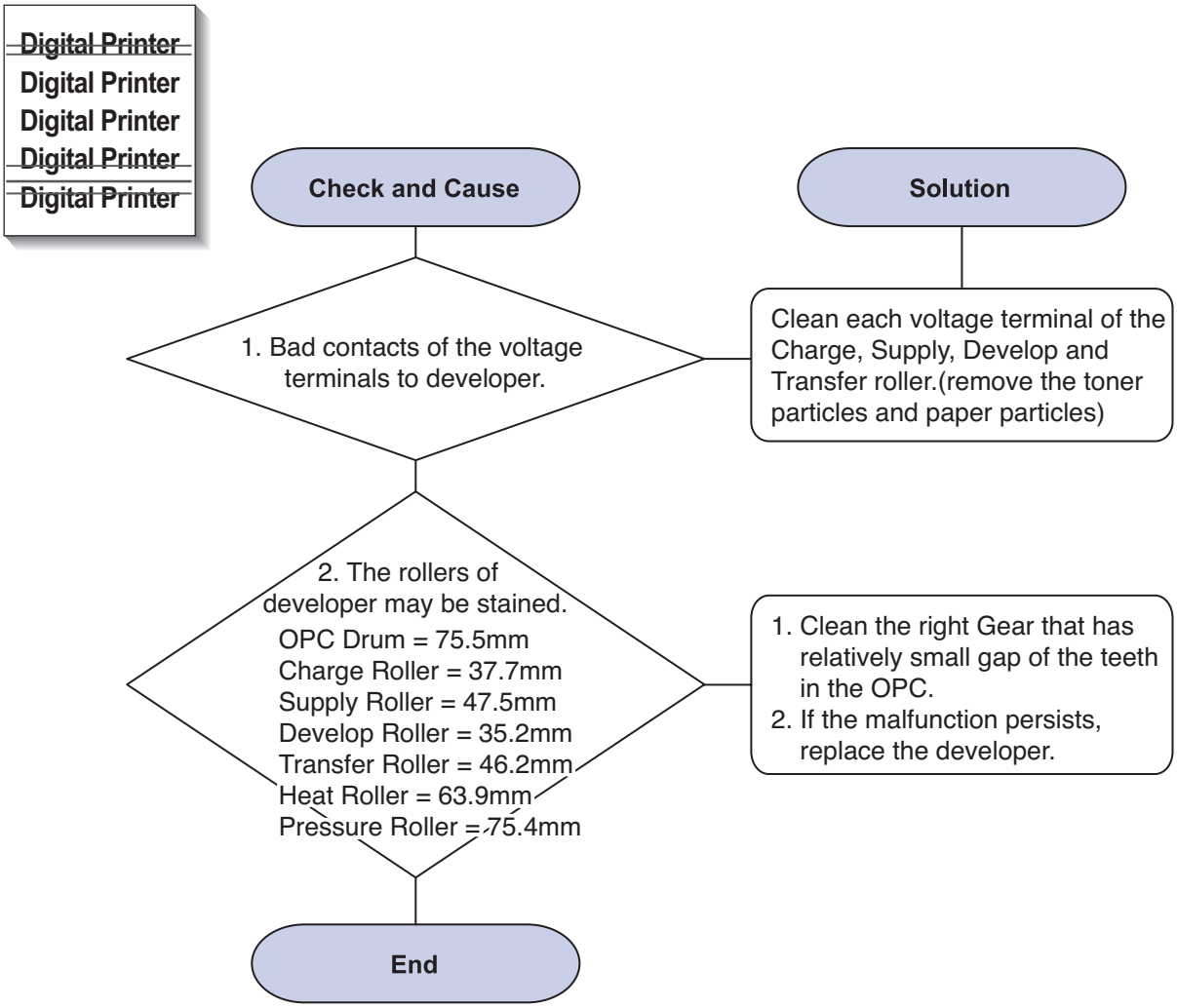
2) Vertical White Line

• **Description** White vertical voids in the image.


Digital Printer
Digital Printer
Digital Printer
Digital Printer
Digital Printer
Check and Cause
Solution
1. Foreign matter stuck onto the window of internal lenses of LSU mirror.
Foreign matter stuck onto the window : Clean the LSU window with recommended cleaner(IPA) Clean the window with a clean cotton swab.
2. Foreign matter or toner particles between the toner cartridge roller and blade. (In case the life of the toner cartridge has been expired, white lines or light image occur in front of the image.)
Replace the toner cartridge.
3. It may occur when Burr and foreign substances are on the window of the toner cartridge frame.
No 3. : Remove the foreign matter and burr of the exposure window. (toner cartridge)
4. If the fuser is defective, voids occur periodically at the top of a black image.
No. 4. : Open the front cover and check ribs that corresponds to the position of the voids. Remove if found.
5. It may occur when foreign substances are on the OPC Drum.
If the problems are not solved, replace the toner cartridge.
End

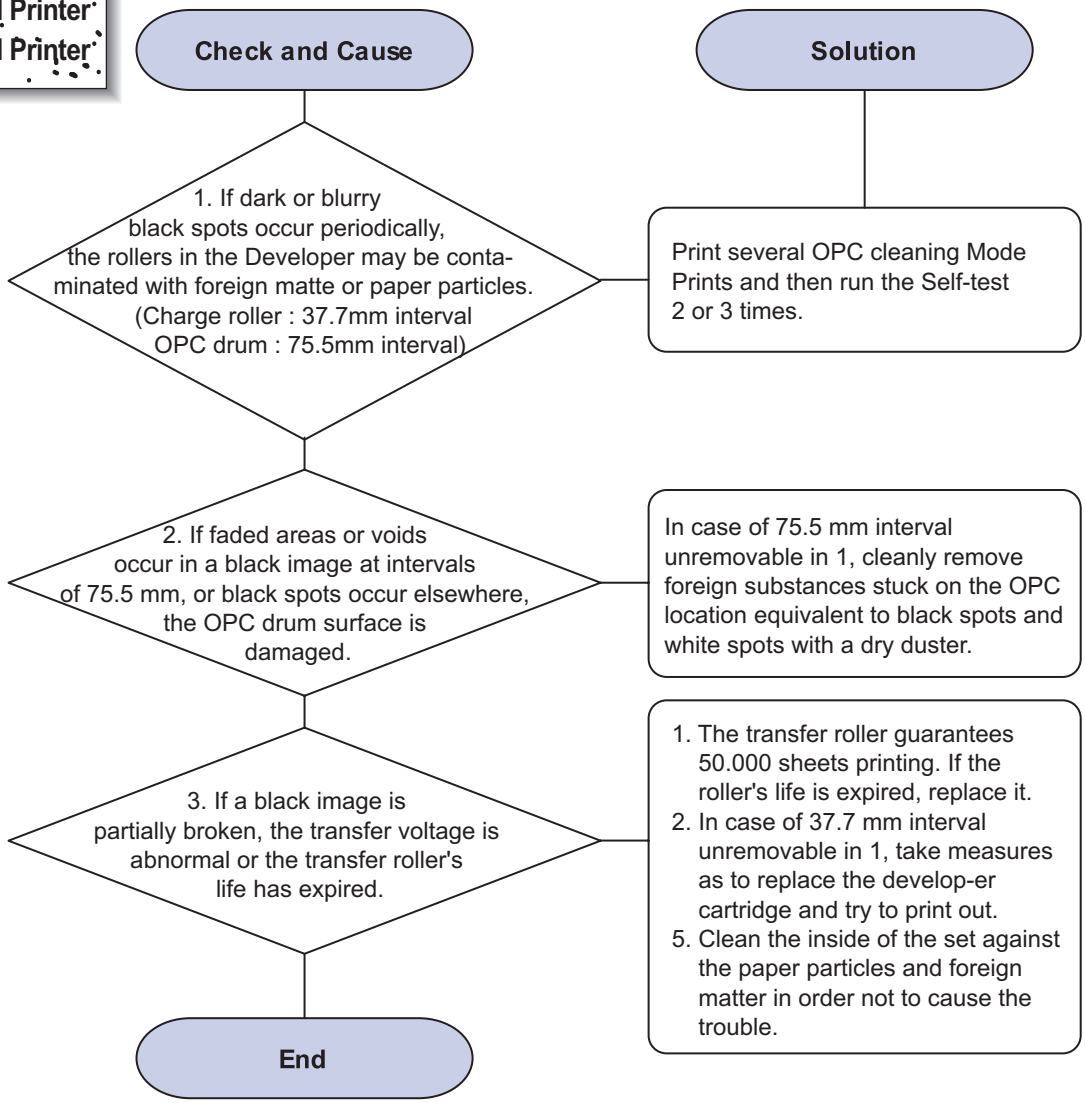
3) Horizontal Black Band

• **Description** Dark or blurry horizontal stripes occur in the printing periodically.
(They may not occur periodically.)


Digital Printer
Digital Printer
Digital Printer
Digital Printer
Digital Printer
Check and Cause
Solution
1. Bad contacts of the voltage terminals to developer.
Clean each voltage terminal of the Charge, Supply, Develop and Transfer roller.(remove the toner particles and paper particles)
2. The rollers of developer may be stained.
OPC Drum = 75.5mm
Charge Roller = 37.7mm
Supply Roller = 47.5mm
Develop Roller = 35.2mm
Transfer Roller = 46.2mm
Heat Roller = 63.9mm
Pressure Roller = 75.4mm
1. Clean the right Gear that has relatively small gap of the teeth in the OPC.
2. If the malfunction persists, replace the developer.
End

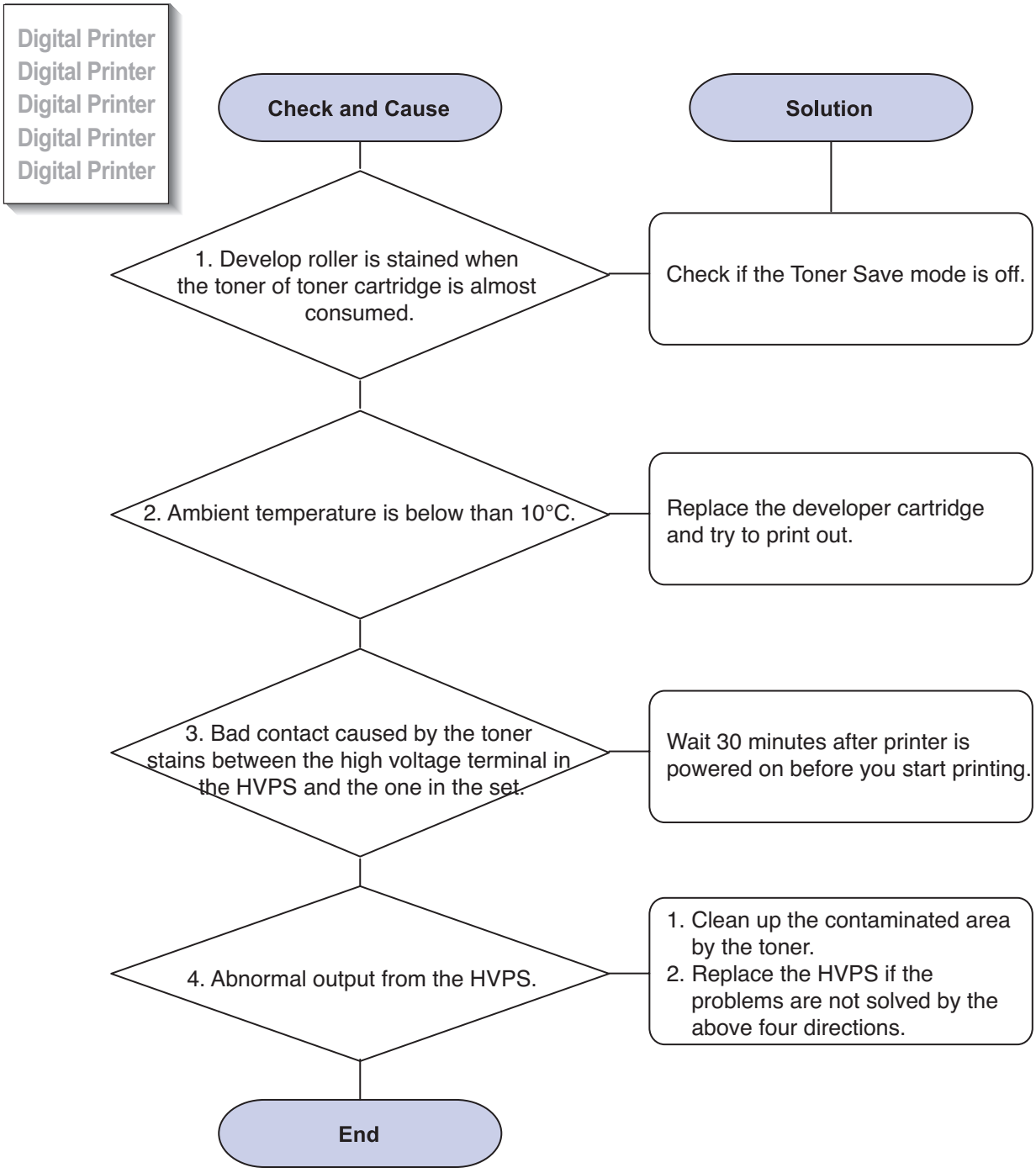
4) Black/White Spot

• **Description** 1. Dark or blurry spots occur periodically in the printing
2. White spots occur periodically in the printing


Check and Cause
Solution
1. If dark or blurry black spots occur periodically, the rollers in the Developer may be contaminated with foreign matte or paper particles. (Charge roller : 37.7mm interval OPC drum : 75.5mm interval)
Print several OPC cleaning Mode Prints and then run the Self-test 2 or 3 times.
2. If faded areas or voids occur in a black image at intervals of 75.5 mm, or black spots occur elsewhere, the OPC drum surface is damaged.
In case of 75.5 mm interval unremovable in 1, cleanly remove foreign substances stuck on the OPC location equivalent to black spots and white spots with a dry duster.
3. If a black image is partially broken, the transfer voltage is abnormal or the transfer roller's life has expired.
1. The transfer roller guarantees 50.000 sheets printing. If the roller's life is expired, replace it.
2. In case of 37.7 mm interval unremovable in 1, take measures as to replace the develop-er cartridge and try to print out.
5. Clean the inside of the set against the paper particles and foreign matter in order not to cause the trouble.
End

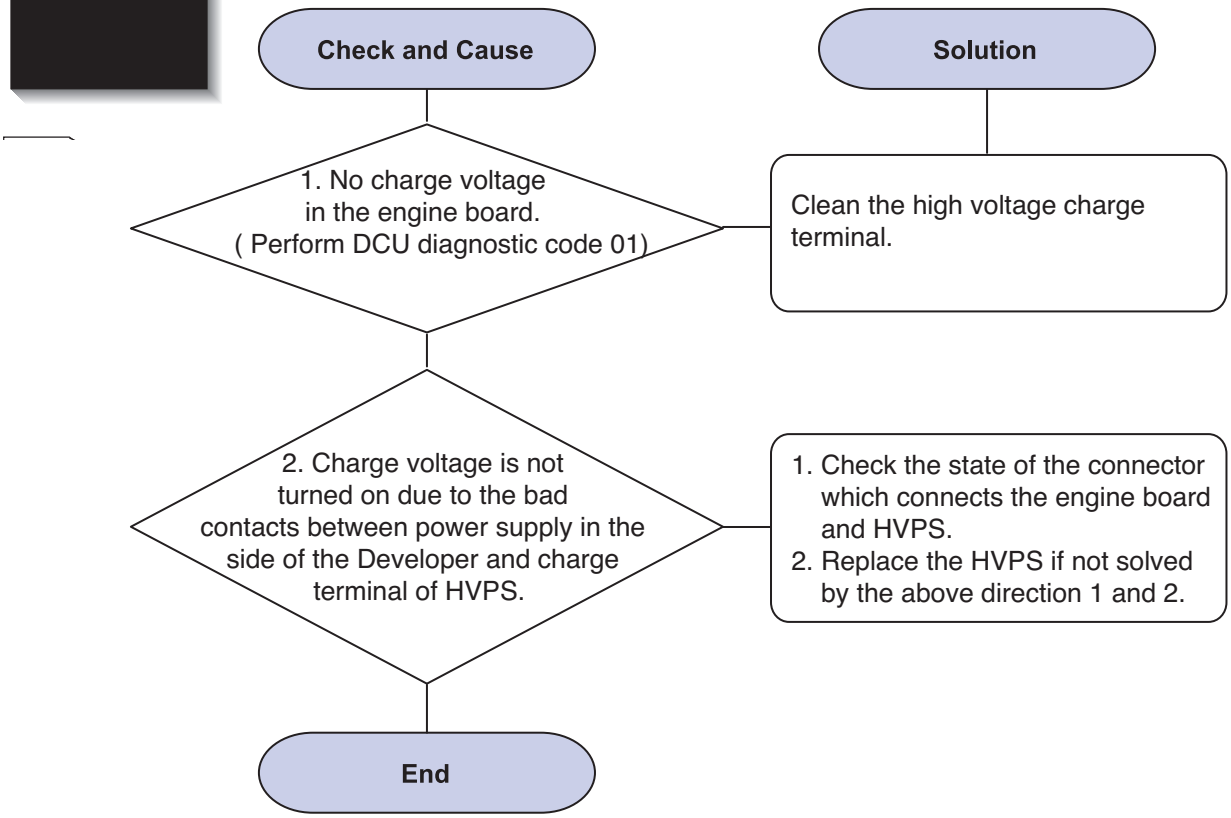
5) Light Image

• **Description** The printed image is light, with no ghost.


Digital Printer
Digital Printer
Digital Printer
Digital Printer
Digital Printer
Check and Cause
Solution
1. Develop roller is stained when the toner of toner cartridge is almost consumed.
Check if the Toner Save mode is off.
2. Ambient temperature is below than 10°C.
Replace the developer cartridge and try to print out.
3. Bad contact caused by the toner stains between the high voltage terminal in the HVPS and the one in the set.
Wait 30 minutes after printer is powered on before you start printing.
4. Abnormal output from the HVPS.
1. Clean up the contaminated area by the toner.
2. Replace the HVPS if the problems are not solved by the above four directions.
End

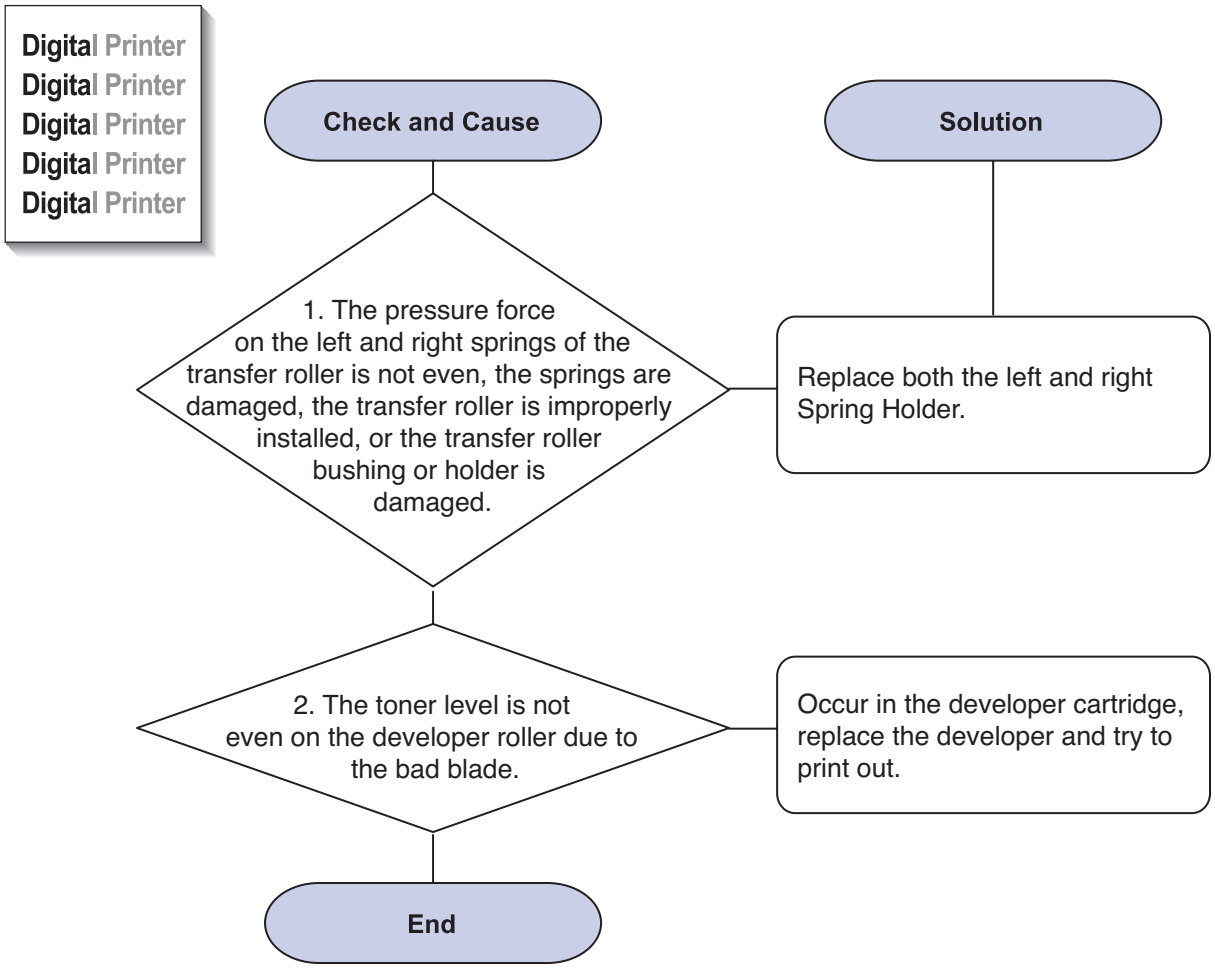
6) Dark Image or a Black Page

• **Description** The printed image is dark.


Check and Cause
Solution
1. No charge voltage in the engine board. (Perform DCU diagnostic code 01)
Clean the high voltage charge terminal.
2. Charge voltage is not turned on due to the bad contacts between power supply in the side of the Developer and charge terminal of HVPS.
1. Check the state of the connector which connects the engine board and HVPS.
2. Replace the HVPS if not solved by the above direction 1 and 2.
End

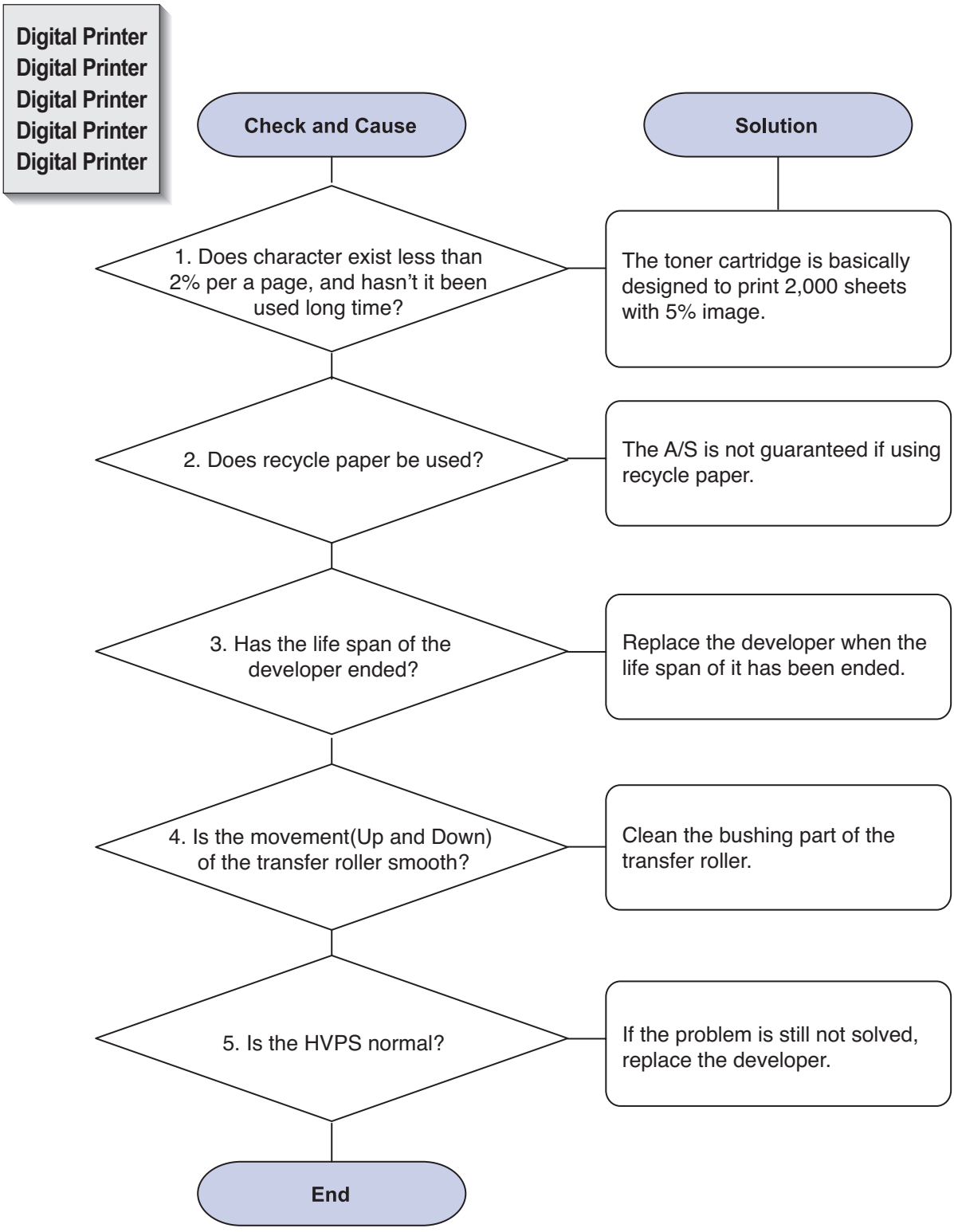
7) Uneven Density

• **Description** Print Density is uneven between left and right.


Digital Printer
Digital Printer
Digital Printer
Digital Printer
Digital Printer
Check and Cause
Solution
1. The pressure force on the left and right springs of the transfer roller is not even, the springs are damaged, the transfer roller is improperly installed, or the transfer roller bushing or holder is damaged.
Replace both the left and right Spring Holder.
2. The toner level is not even on the developer roller due to the bad blade.
Occur in the developer cartridge, replace the developer and try to print out.
End

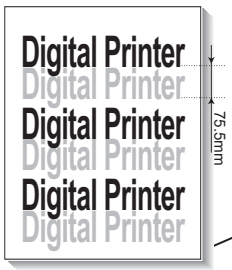
8) Background

• **Description** Light dark background appears in whole area of the printing.


Digital Printer
Digital Printer
Digital Printer
Digital Printer
Digital Printer
Check and Cause
Solution
1. Does character exist less than 2% per a page, and hasn't it been used long time?
The toner cartridge is basically designed to print 2,000 sheets with 5% image.
2. Does recycle paper be used?
The A/S is not guaranteed if using recycle paper.
3. Has the life span of the developer ended?
Replace the developer when the life span of it has been ended.
4. Is the movement(Up and Down) of the transfer roller smooth?
Clean the bushing part of the transfer roller.
5. Is the HVPS normal?
If the problem is still not solved, replace the developer.
End

9) Ghost (1)

• **Description** Ghost occurs at 75.5 mm intervals of the OPC drum in the whole printing.

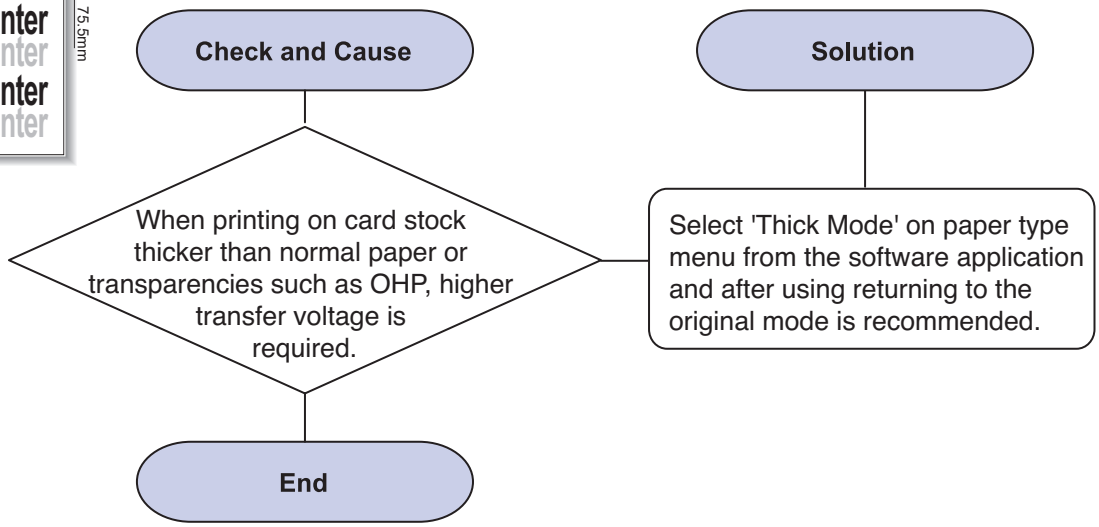


Check and Cause	Solution
1. Bad contacts caused by contamination from toner particles between high voltage terminal in the main body and the electrode of the Developer.	Clean the terminals when contaminated by toner particles.
2. Bad contacts caused by contamination from toner particles between high voltage terminal in the main body and the one in the HVPS board.	Occur in the developer cartridge, replace the developer and try to print out.
3. The life of developer is expired.	Replace the engine board if not solved by the above directions 1-2.
4. Transfer roller lifetime (50.000 sheets) has expired.	If not solved by the direction 3, check the transfer roller lifetime and replace it.
5. Abnormal low temperature (below 10°C).	Wait about 1 hour after power on before using printer.

End

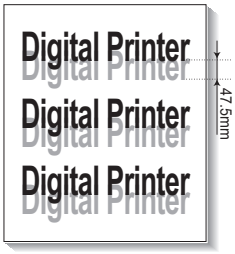
10) Ghost (2)

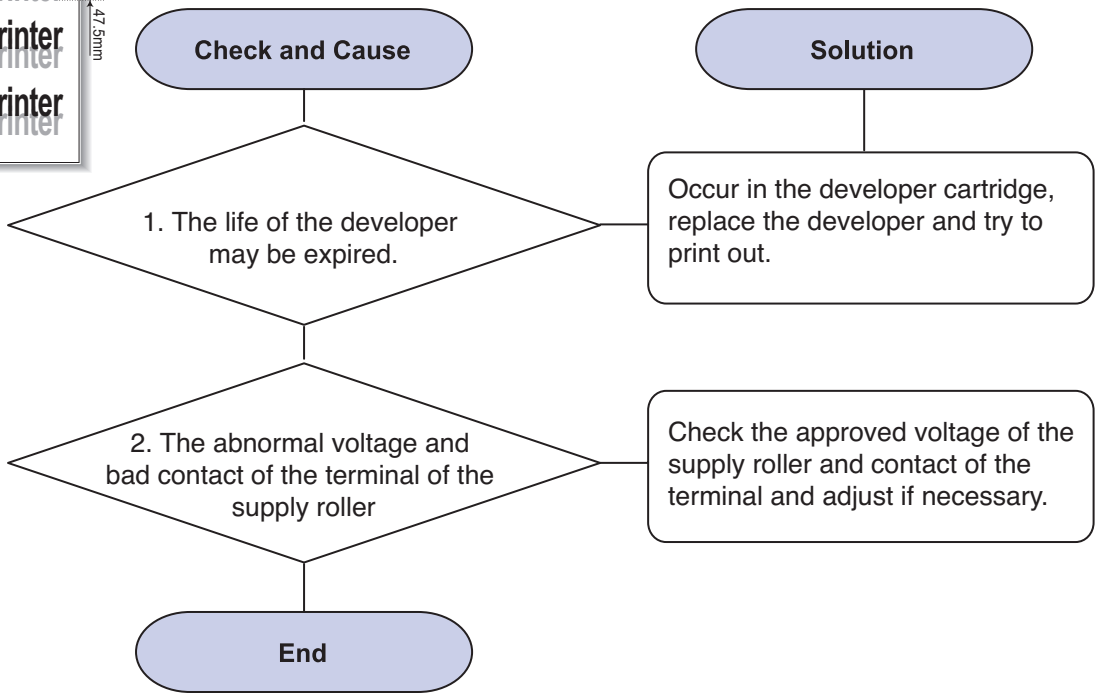
• **Description** Ghost occurs at 75.5 mm intervals of the OPC drum in the whole printing.
(When printing on card stock or transparencies using manual feeder)


Check and Cause
When printing on card stock thicker than normal paper or transparencies such as OHP, higher transfer voltage is required.
End
Solution
Select 'Thick Mode' on paper type menu from the software application and after using returning to the original mode is recommended.

11) Ghost (3)

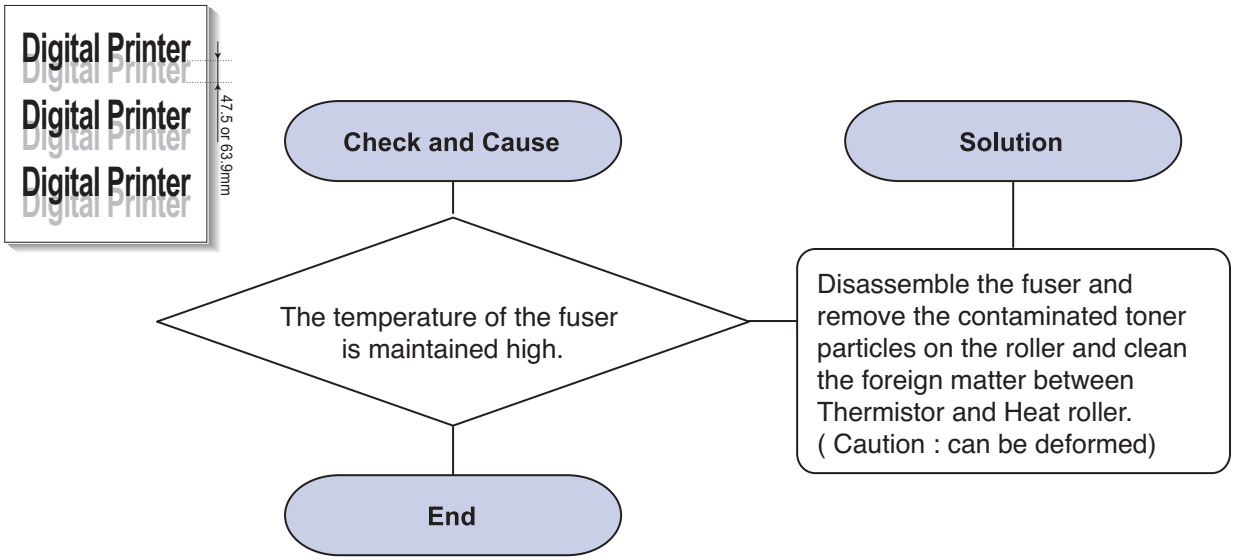
• **Description** White ghost occurs in the black image printing at 47.5mm intervals.




Check and Cause
Solution
1. The life of the developer may be expired.
Occur in the developer cartridge, replace the developer and try to print out.
2. The abnormal voltage and bad contact of the terminal of the supply roller
Check the approved voltage of the supply roller and contact of the terminal and adjust if necessary.
End

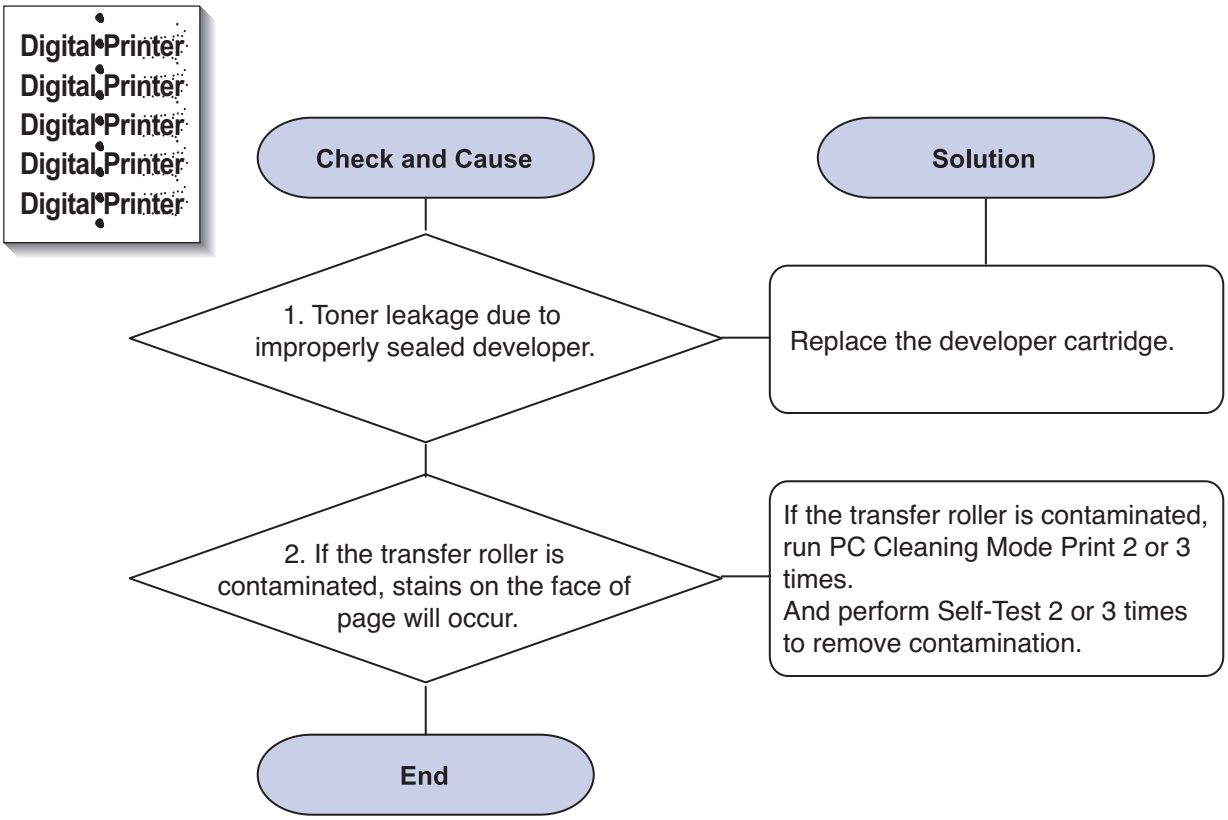
12) Ghost (4)

• **Description** Ghost occurs at 47.5mm(or 63.9mm) intervals.


Digital Printer
Digital Printer
Digital Printer
47.5 or 63.9mm
Check and Cause
Solution
The temperature of the fuser is maintained high.
Disassemble the fuser and remove the contaminated toner particles on the roller and clean the foreign matter between Thermistor and Heat roller.
(Caution : can be deformed)
End

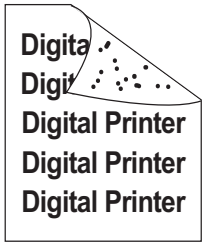
13) Stains on the Face of Page

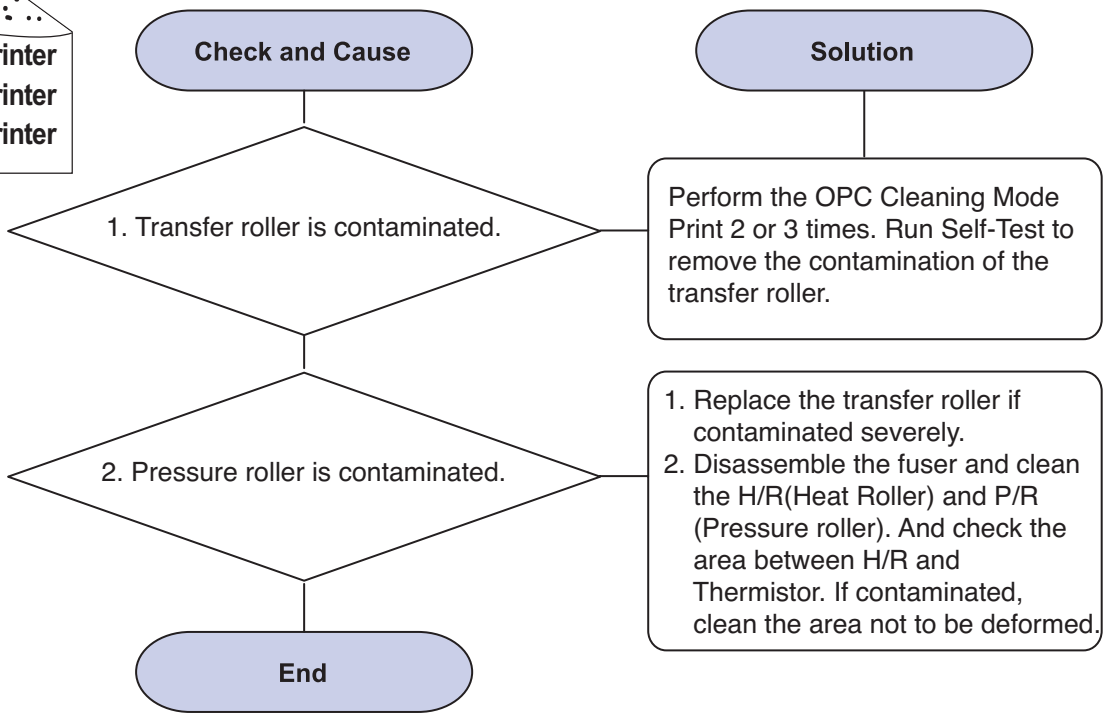
• **Description** The background on the face of the printed page is stained.


Digital Printer
Digital Printer
Digital Printer
Digital Printer
Digital Printer
Check and Cause
Solution
1. Toner leakage due to improperly sealed developer.
Replace the developer cartridge.
2. If the transfer roller is contaminated, stains on the face of page will occur.
If the transfer roller is contaminated, run PC Cleaning Mode Print 2 or 3 times.
And perform Self-Test 2 or 3 times to remove contamination.
End

14) Stains on Back of Page

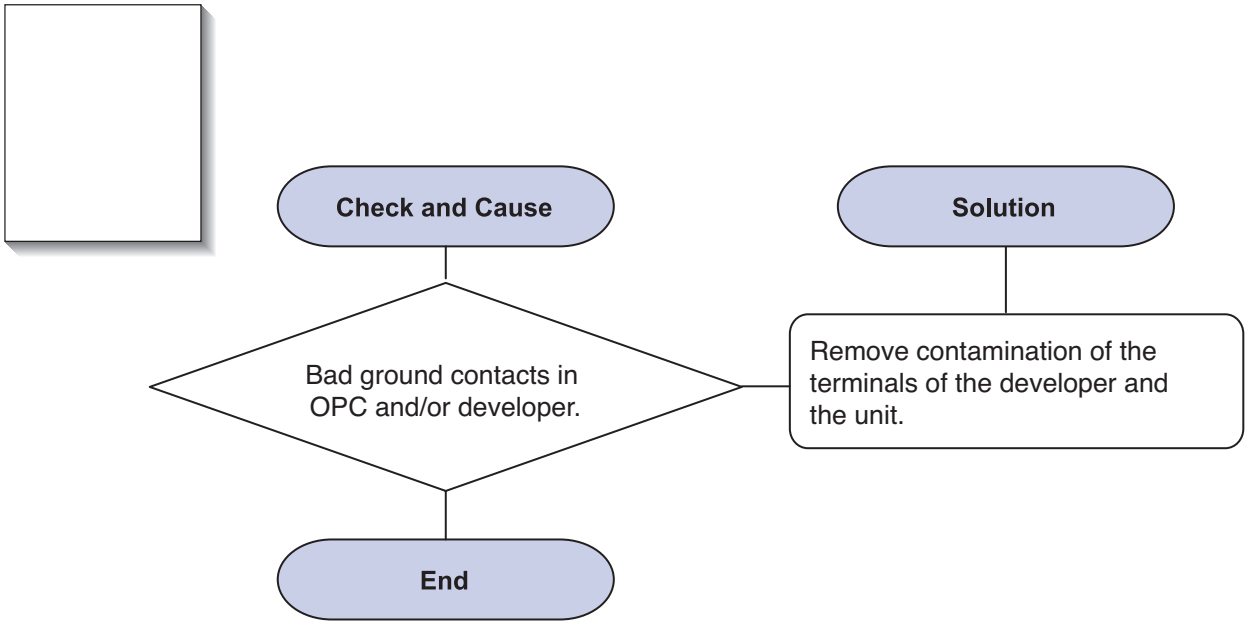
• **Description** The back of the page is stained at 47 mm intervals.




Check and Cause
Solution
1. Transfer roller is contaminated.
Perform the OPC Cleaning Mode Print 2 or 3 times. Run Self-Test to remove the contamination of the transfer roller.
2. Pressure roller is contaminated.
1. Replace the transfer roller if contaminated severely.
2. Disassemble the fuser and clean the H/R(Heat Roller) and P/R (Pressure roller). And check the area between H/R and Thermistor. If contaminated, clean the area not to be deformed.
End

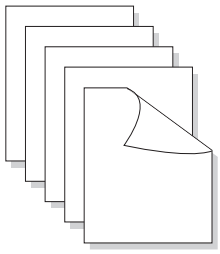
15) Blank Page Print out (1)

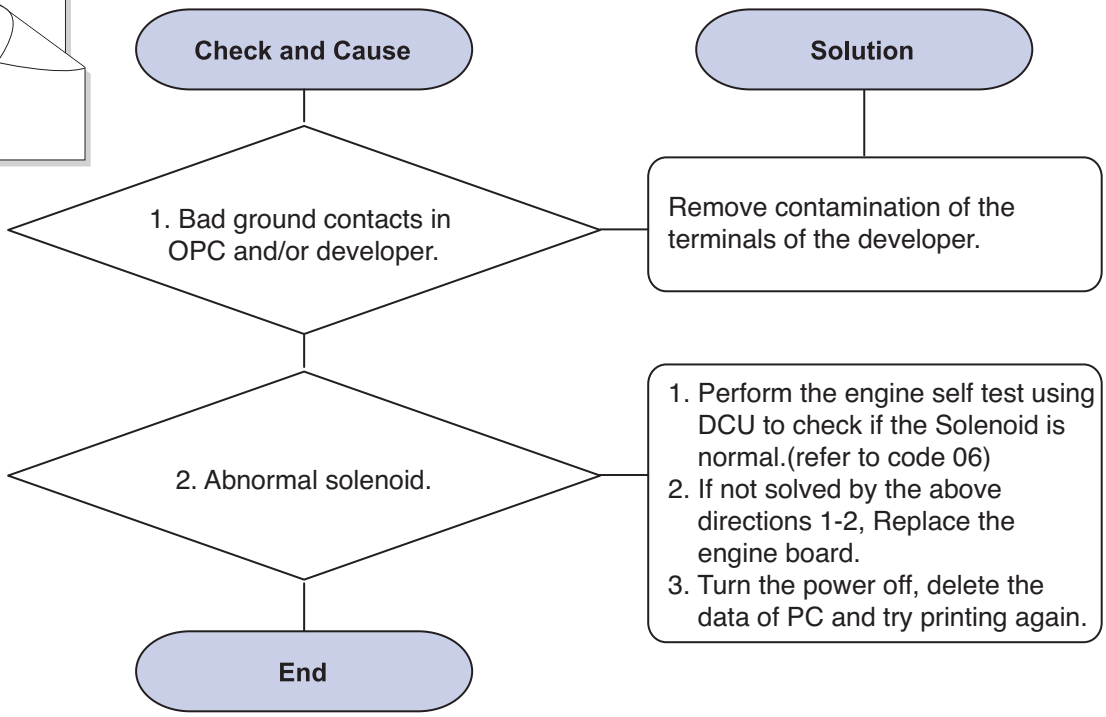
• **Description** Blank page is printed.


Check and Cause
Solution
Bad ground contacts in OPC and/or developer.
Remove contamination of the terminals of the developer and the unit.
End

16) Blank Page Print out (2)

• **Description**
1. Blank page is printed.
2. One or several blank pages are printed.
3. When the printer turns on, several blank pages print.




Check and Cause
Solution
1. Bad ground contacts in OPC and/or developer.
Remove contamination of the terminals of the developer.
2. Abnormal solenoid.
1. Perform the engine self test using DCU to check if the Solenoid is normal.(refer to code 06)
2. If not solved by the above directions 1-2, Replace the engine board.
3. Turn the power off, delete the data of PC and try printing again.
End

5. Exploded Views and Parts List

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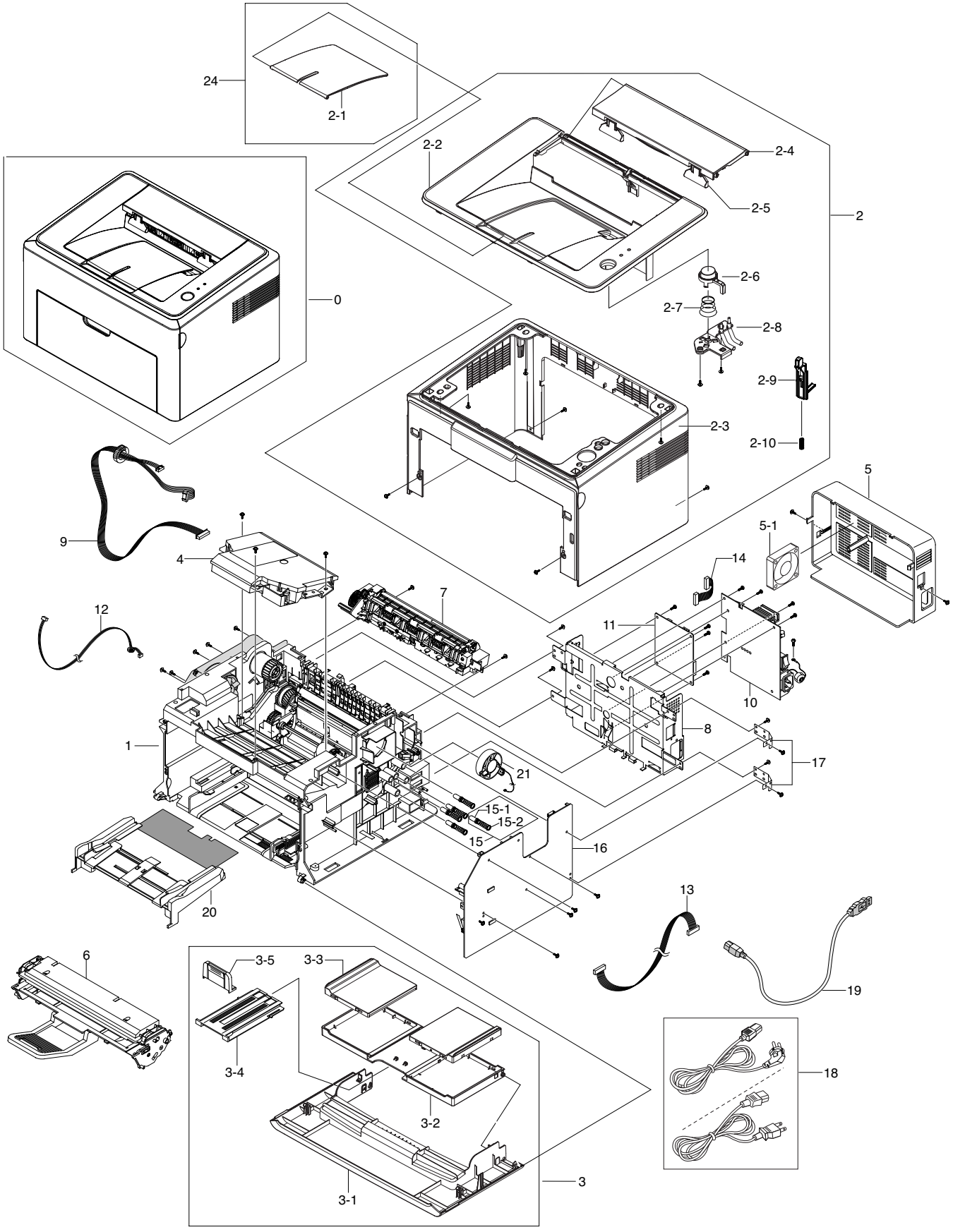
LASER PRINTER

The keynote of Product

- Speed
  ML-1640 : 16 ppm (A4), 17 ppm(Ltr)
  ML-2240 : 22ppm (A4), 23 ppm (Ltr)
- Emulation : GDI
- Processor : 150 Mhz Jupiter4e CPU
- Memory : 8 MB
- Toner cartridge : Initial (0.7K), Sales (1.5K)
- MP tray : Only ML-2240
- Interface : Full Speed USB 2.0
- Machine life : 50K (pages)

5.1 Main Assembly



Main Parts List

*SA : SERVICE AVAILABLE, SNA : SERVICE not AVAILABLE
*Grade : Parts Class"A,B,C,D,E"

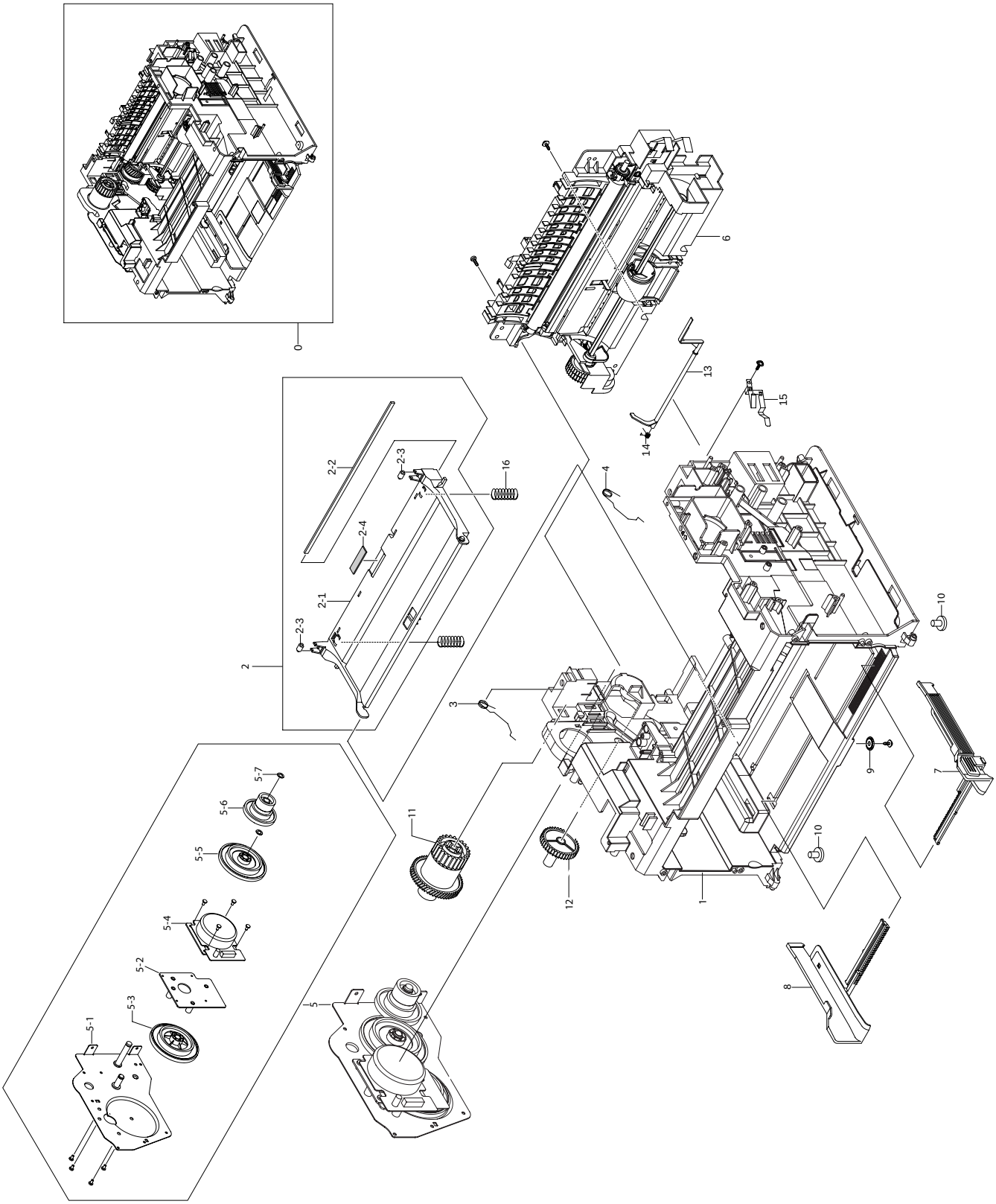
Drawer#	SEC_CODE	DESCRIPTION	QT'Y	Service	Grade	Remark
5.1-0	ML-2240	SET				
5.1-0	ML-1640	SET				
5.1-1	JC96-05123A	ELA UNIT-FRAME	1	SA	A	2240
5.1-1	JC96-05120A	ELA UNIT-FRAME	1	SA	A	1640
5.1-2	JC97-03181A	MEA-COVER MAIN	1	SA	A	1640
5.1-2	JC97-03182E	MEA-COVER MAIN	1	SA	A	1645
5.1-2-1	JC61-01460D	GUIDE-STACKER COVER	1	SNA	B	1640
5.1-2-1	JC61-01460E	GUIDE-STACKER COVER	1	SNA	B	1645
5.1-2-2	JC63-01886A	COVER-TOP	1	SA	B	1640
5.1-2-2	JC63-01886M	COVER-TOP	1	SA	B	1645
5.1-2-3	JC63-01887A	COVER-MAIN	1	SA	B	1640
5.1-2-3	JC63-01887B	COVER-MAIN	1	SA	B	1645
5.1-2-4	JC63-01888A	COVER-JAM	1	SA	B	1640
5.1-2-4	JC63-01888B	COVER-JAM	1	SA	B	1645
5.1-2-5	JC72-01343A	PMO-SUB_M_STACKER	2	SA	D	
5.1-2-6	JC64-00406A	KEY-ONLINE	1	SNA	D	
5.1-2-7	6107-001169	SPRING-CS	1	SA	B	
5.1-2-8	JC67-00301A	LENS-LED	1	SA	B	
5.1-2-9	JC66-02005A	ACTUATOR-JAM	1	SNA	B	
5.1-2-10	JC61-00049A	SPRING ETC-TR(KOR)	1	SNA	B	
5.1-3	JC97-03183A	MEA UNIT-COVER FRONT	1	SA	B	1645
5.1-3	JC97-03184A	MEA UNIT-COVER FRONT	1	SA	B	1640
5.1-3-1	JC63-01883A	COVER-FRONT	1	SA	B	1640
5.1-3-1	JC63-01883B	COVER-FRONT	1	SA	B	1645
5.1-3-2	JC63-01885A	COVER-CASSETTE	1	SA	B	1640
5.1-3-2	JC63-01885B	COVER-CASSETTE	1	SA	B	1645
5.1-3-3	JC63-01890A	COVER-DUMMY CASSETTE	2	SA	B	1640
5.1-3-3	JC63-01890B	COVER-DUMMY CASSETTE	2	SA	B	1645
5.1-3-4	JC63-00628F	TRAY-EXTENSION LARGE	1	SA	B	
5.1-3-5	JC63-00629F	TRAY-EXTENSION SMALL	1	SA	B	
5.1-4	JC96-04065A	ELA UNIT-LSU	1	SA	A	
5.1-5	JC63-01892A	COVER-SMPS	1	SA	B	1640
5.1-5	JC63-01892B	COVER-SMPS	1	SA	B	1645
5.1-5-1	JC31-00092A	FAN	1	SA	A	
5.1-6	JC96-05045A	CARTRIDGE-TONER	1	SNA	B	1640/2240

Main Parts List

*SA : SERVICE AVAILABLE, SNA : SERVICE not AVAILABLE
*Grade : Parts Class"A,B,C,D,E"

Drawer#	SEC_CODE	DESCRIPTION	QT'Y	Service	Grade	Remark
5.1-7	JC96-05121A	ELA HOU-FUSER	1	SA	A	1640/110V
5.1-7	JC96-05122B	ELA HOU-FUSER	1	SA	A	ML-1640/XIP
5.1-7	JC96-05124A	ELA HOU-FUSER	1	SA	A	2240/110V
5.1-7	JC96-05125A	ELA HOU-FUSER	1	SA	A	2240/220V
5.1-8	JC63-01930A	SHIELD-ENGINE	1	SA	B	
5.1-9	JC39-00936A	HARNESS-LSU	1	SA	B	
5.1-10	JC44-00109A	SMPS-V1_VE	1	SA	A	1640/110V
5.1-10	JC44-00110A	SMPS-V2C_VE	1	SA	A	1640/220V
5.1-10	JC44-00086A	SMPS-V1	1	SA	D	2240/110V
5.1-10	JC44-00087A	SMPS-V2C	1	SA	D	2240/220V
5.1-11	JC92-02027A	PBA-MAIN	1	SA	B	
5.1-11	JC92-02018A	PBA-MAIN	1	SA	B	
5.1-12	JC39-00937A	HARNESS-MOTOR	1	SA	B	1640
5.1-12	JC39-00932A	HARNESS-MOTOR	1	SA	B	2240
5.1-13	JC39-00400A	CBF HARNESS-HVPS	1	SA	A	
5.1-14	JC39-00402A	CBF HARNESS-SMPS	1	SA	A	
5.1-15	JC96-01672A	ELA UNIT-TERMINAL TR L	3	SA	D	
5.1-15-1	JC61-00031A	SPRING ETC--HV LARGE	1	SNA	A	
5.1-15-2	JC70-40912A	ICT-SHAFT HV LARGE	1	SA	D	
5.1-16	JC44-00167A	HVPS	1	SA	A	
5.1-17	JC63-00631A	GROUND-P-HVPS	2	SNA	A	
5.1-18	3903-000042	CBF-POWER CORD	1	SA	B	220V
5.1-18	3903-000085	CBF-POWER CORD	1	SA	B	110V
5.1-19	3722-002303	JACK-USB	1	SA	A	
5.1-20	JC97-02239G	MEA UNIT-MP TRAY	1	SA	A	2240
5.1-21	JC31-00085A	FAN-DC	1	SA	A	

5.2 Frame Assembly (ML-2240)

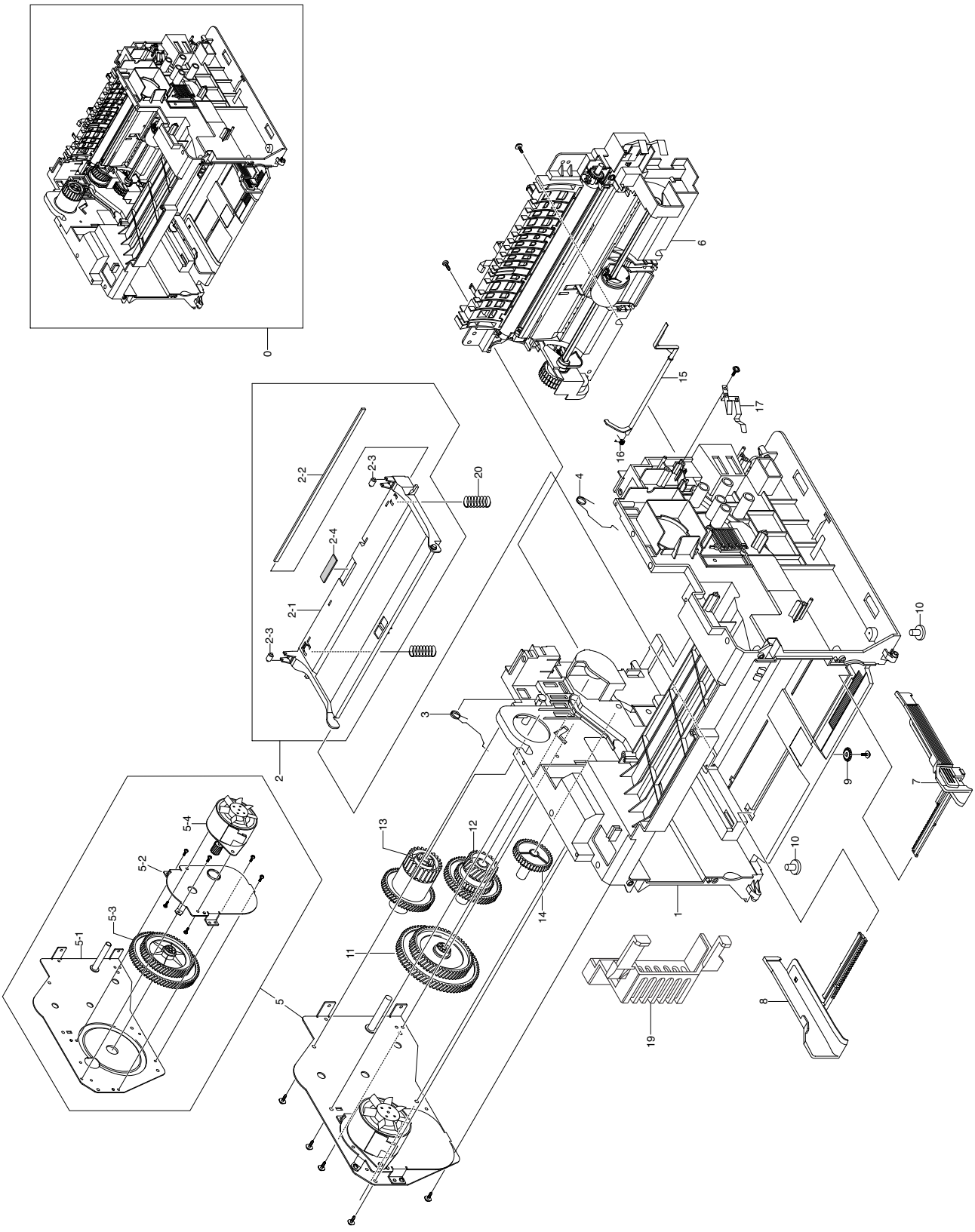


Frame Parts List(ML-2240)

*SA : SERVICE AVAILABLE, SNA : SERVICE not AVAILABLE
*Grade : Parts Class"A,B,C,D,E"

Drawer#	SEC_CODE	DESCRIPTION	QT'Y	Service	Grade	Remark
5.2-0	JC96-05123A	ELA UNIT-FRAME	1	SA	A	
5.2-1	JC61-02567A	FRAME-BASE	1	SA	A	
5.2-2	JC97-02218A	MEA UNIT-PLATE KNOCK_UP	1	SA	A	
5.2-2-1	JC61-01158A	PLATE-M-KNOCK_UP	1	SA	A	
5.2-2-2	JC66-00720A	SHAFT-P-CORE	1	SA	A	
5.2-2-3	JC72-01004A	PMO-IDLE KNOCK UP MP	2	SA	A	
5.2-2-4	JC74-00011A	MPR-PAD KNOCK UP MP	1	SA	A	
5.2-3	JC61-01258A	SPRING ETC-TORSION DEVE_L	1	SA	A	
5.2-4	JC61-01259A	SPRING ETC-TORSION DEVE_R	1	SA	A	
5.2-5	JC96-05018A	ELA UNIT-DRIVE	1	SA	A	
5.2-5-1	JC61-02619A	BRACKET-GEAR	1	SNA	D	
5.2-5-2	JC61-02577A	BRACKET-MOTOR	1	SNA	B	
5.2-5-3	JC66-01998A	GEAR-RDCN A	1	SNA	B	
5.2-5-4	JC31-00090B	MOTOR BLDC	1	SNA	A	
5.2-5-5	JC66-01999A	GEAR-RDCN B	1	SNA	B	
5.2-5-6	JC66-00806A	GEAR-OPC DR 76/38/29	1	SA	A	
5.2-5-7	6031-000023	WASHER-PLAIN	2	SA	A	
5.2-6	JC97-02218A	MEA UNIT-PLATE KNOCK_UP	1	SA	A	
5.2-7	JC70-00500C	ADJUST-CASSETTE_R	1	SA	A	
5.2-8	JC70-00499C	ADJUST-CASSETTE_L	1	SA	A	
5.2-9	JG66-40003A	GEAR-PINION	1	SA	A	
5.2-10	JC61-00836A	FOOT-FRONT	2	SA	A	
5.2-11	JC66-00807A	GEAR-FUSER DR 63/35	1	SA	A	
5.2-12	JC66-00808A	GEAR-FEED DR 41	1	SA	A	
5.2-13	JC66-00822A	LEVER-M-ACTUATOR_EMPTY	1	SA	A	
5.2-14	JB61-00076A	SPRING ETC-TORSION DOC (CC2-F)	1	SA	A	
5.2-15	JC63-00622A	GROUND-P-OPC	1	SA	A	
5.2-16	6107-001503	SPRING-CS	2	SA	A	

5.3 Frame Assembly(ML-1640)

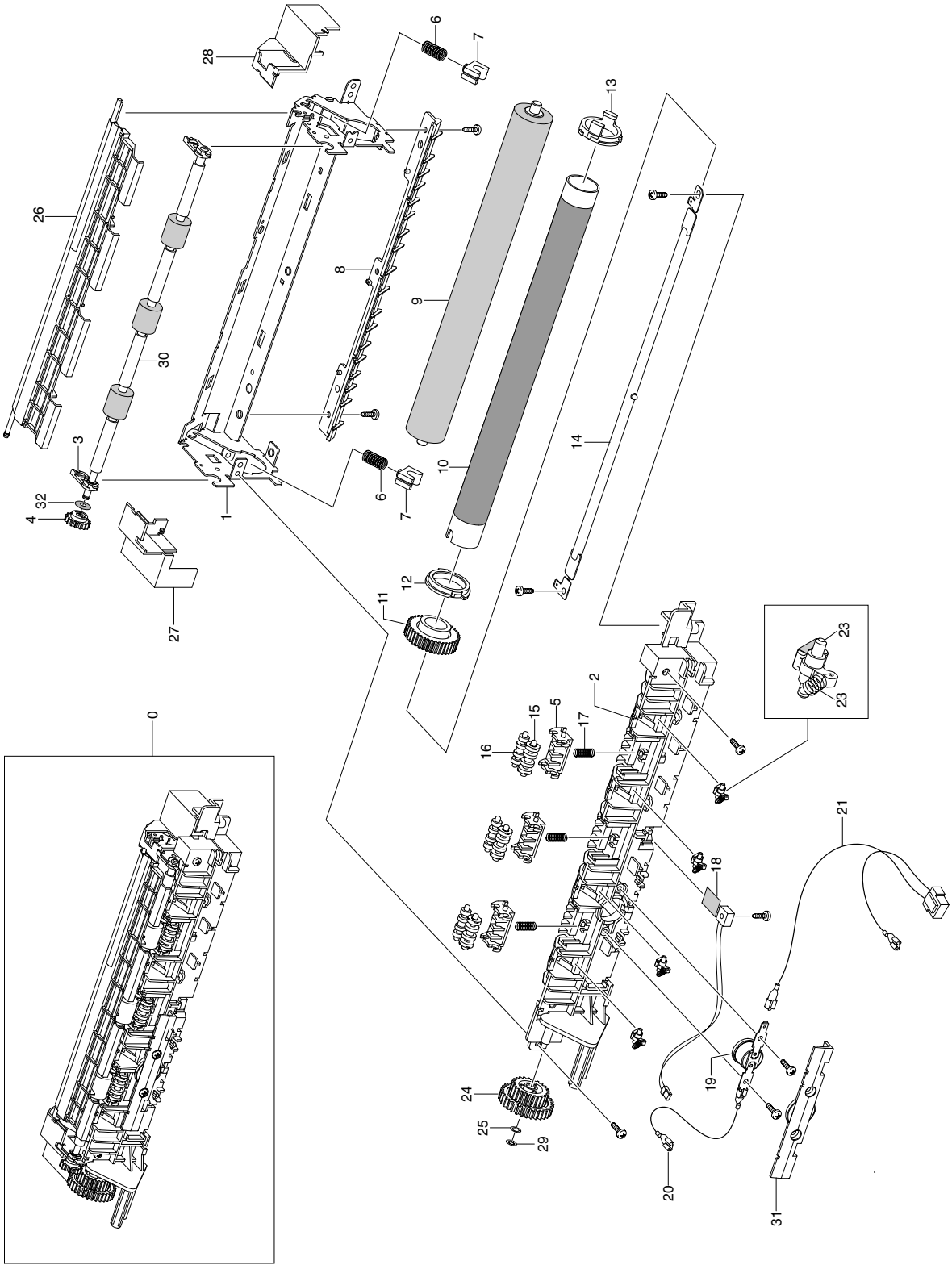


Frame Parts List(ML-1640)

*SA : SERVICE AVAILABLE, SNA : SERVICE not AVAILABLE
*Grade : Parts Class"A,B,C,D,E"

Drawer#	SEC_CODE	DESCRIPTION	QT'Y	Service	Grade	Remark
5.3-0	JC96-05120A	ELA UNIT-FRAME	1	SA	A	
5.3-1	JC61-01152A	FRAME-M-BASE	1	SNA	A	
5.3-2	JC97-02218A	MEA UNIT-PLATE KNOCK_UP	1	SA	A	
5.3-2-1	JC61-01158A	PLATE-M-KNOCK_UP	1	SA	A	
5.3-2-2	JC66-00720A	SHAFT-P-CORE	1	SA	A	
5.3-2-3	JC72-01004A	PMO-IDLE KNOCK UP MP	2	SA	A	
5.3-2-4	JC74-00011A	MPR-PAD KNOCK UP MP	1	SA	A	
5.3-3	JC61-01258A	SPRING ETC-TORSION DEVE_L	1	SA	A	
5.3-4	JC61-01259A	SPRING ETC-TORSION DEVE_R	1	SA	A	
5.3-5	JC96-05116A	ELA UNIT-DRIVE	1	SA	A	
5.3-5-1	JC61-01153A	BRACKET-P-GEAR	1	SNA	A	
5.3-5-2	JC61-01154A	BRACKET-P-MOTOR	1	SNA	A	
5.3-5-3	JC66-00804A	GEAR-RDCN 139/83	1	SA	A	
5.3-5-4	JC31-00112A	MOTOR STEP	1	SA	A	
5.3-6	JC97-02218A	MEA UNIT-PLATE KNOCK_UP	1	SA	A	
5.3-7	JC70-00500C	ADJUST-CASSETTE_R	1	SA	A	
5.3-8	JC70-00499C	ADJUST-CASSETTE_L	1	SA	A	
5.3-9	JG66-40003A	GEAR-PINION	1	SA	A	
5.3-10	JC61-00836A	FOOT-FRONT	2	SA	A	
5.3-11	JC66-00805A	GEAR-RDCN 113/83	1	SA	A	
5.3-12	JC66-00806A	GEAR-OPC DR 76/38/29	1	SA	A	
5.3-13	JC66-00807A	GEAR-FUSER DR 63/35	1	SA	A	
5.3-14	JC66-00808A	GEAR-FEED DR 41	1	SA	A	
5.3-15	JC66-00822A	LEVER-M-ACTUATOR_EMPTY	1	SA	A	
5.3-16	JB61-00076A	SPRING ETC-TORSION DOC (CC2-F)	1	SA	A	
5.3-17	JC63-00622A	GROUND-P-OPC	1	SA	A	
5.3-18	JC61-00025A	SPRING ETC-CS-CHARGE APOLLO	2	SNA	A	
5.3-19	JC67-00110A	CAP-M-MOTOR	1	SNA	A	

5.4 Fuser Unit

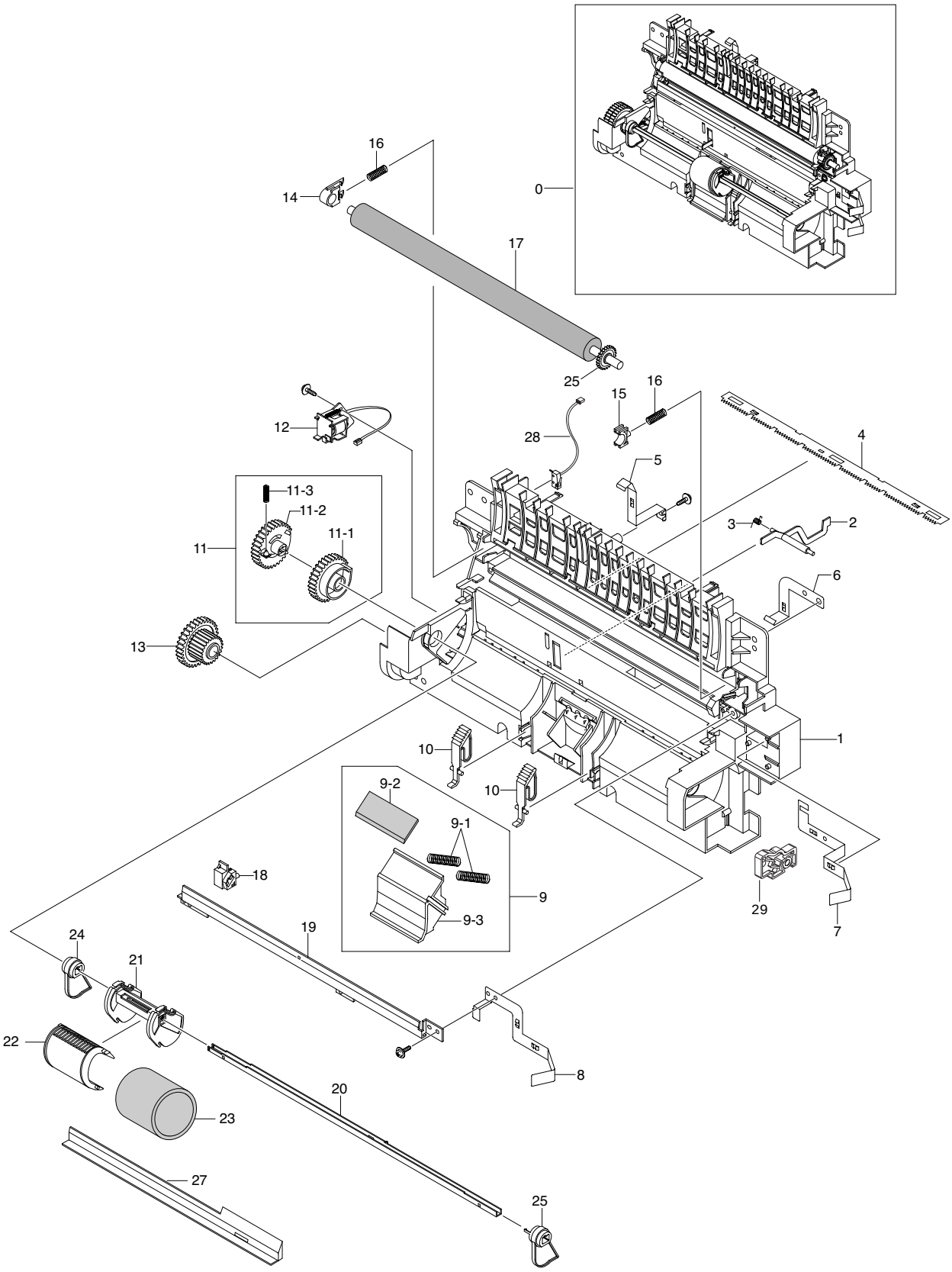


Fuser Parts List

*SA : SERVICE AVAILABLE, SNA : SERVICE not AVAILABLE
*Grade : Parts Class"A,B,C,D,E"

Drawer#	SEC_CODE	DESCRIPTION	QT'Y	Service	Grade	Remark
5.4-0	JC96-05121A	ELA HOU-FUSER	1	SA	A	1640/110V
5.4-0	JC96-05122A	ELA HOU-FUSER	1	SA	A	ML-1640/XSA
5.4-0	JC96-05124A	ELA HOU-FUSER	1	SA	A	2240/110V
5.4-0	JC96-05125A	ELA HOU-FUSER	1	SA	A	2240/220V
5.4-1	JC61-01162A	FRAME-P-FUSER	1	SNA	A	
5.4-2	JC63-00615A	COVER-M_FUSER	1	SNA	D	
5.4-3	JC61-01177A	HOLDER-M-EXIT R	2	SA	A	
5.4-4	JC66-00810A	GEAR-EXIT_DRV17	1	SA	B	
5.4-5	JC61-01172A	HOLDER-M-EXIT F/DOWN	3	SNA	A	
5.4-6	6107-001168	SPRING-CS	2	SA	D	
5.4-7	JC66-10901A	BUSH-PRESSURE R	2	SA	A	
5.4-8	JC61-00595A	GUIDE-M-INPUT	1	SNA	A	
5.4-9	JC66-00600A	ROLLER-PRESSURE	1	SA	A	
5.4-10	JC66-00601B	ROLLER-HEAT	1	SA	A	
5.4-11	JC66-00564A	GEAR-FUSER Z37	1	SA	D	
5.4-12	JC61-00589A	BUSH-M-HR L	1	SA	A	
5.4-13	JC61-00590A	BUSH-M-HR R	1	SA	A	
5.4-14	4713-001202	LAMP-HALOGEN	1	SA	A	1640/220V
5.4-14	4713-001203	LAMP-HALOGEN	1	SA	A	1640/110V
5.4-14	4713-001211	LAMP-HALOGEN	1	SA	A	2240/110V
5.4-14	4713-001212	LAMP-HALOGEN	1	SA	D	2240/220V
5.4-15	JC66-00824A	ROLLER-M-EXIT MAIN	3	SA	D	
5.4-16	JC66-00830A	ROLLER-M-EXIT FR	3	SA	D	
5.4-17	6107-001163	SPRING-CS	3	SA	D	
5.4-18	1404-001451	THERMISTOR-NTC ASSY	1	SA	A	
5.4-19	4712-001032	THERMOSTAT	1	SA	A	
5.4-20	JC39-00404A	CBF HARNESS-FUSER JOINT	1	SA	A	
5.4-21	JC39-00403A	CBF HARNESS-FUSER(110V)	1	SA	A	110V
5.4-21	JC39-00403B	CBF HARNESS-FUSER(220V)	1	SA	A	220V
5.4-22	JC61-00064A	SPRING ETC-CLAW	4	SA	A	
5.4-23	JC61-02580A	GUIDE-CLAW	4	SA	A	
5.4-24	JC66-00801A	GEAR-EXIT_DR38/25	1	SNA	D	
5.4-25	6031-001051	WASHER-PLAIN	1	SNA	A	
5.4-26	JC63-00637A	COVER-M-FUSER-DUMMY	1	SNA	D	
5.4-27	JC63-00639A	COVER-M-LAMP-L	1	SNA	D	
5.4-28	JC63-00638A	COVER-M-LAMP-R	1	SNA	D	
5.4-29	6044-000001	RING-CS	1	SNA	B	
5.4-30	JC66-00826A	ROLLER-EXIT F/DOWN	1	SA	A	
5.4-31	JC67-00085A	CAP-M-THERMO	1	SNA	A	

5.5 Paper Path Unit

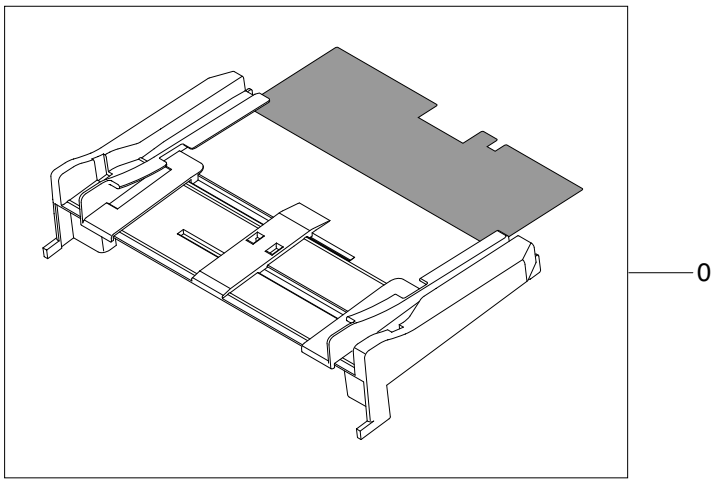


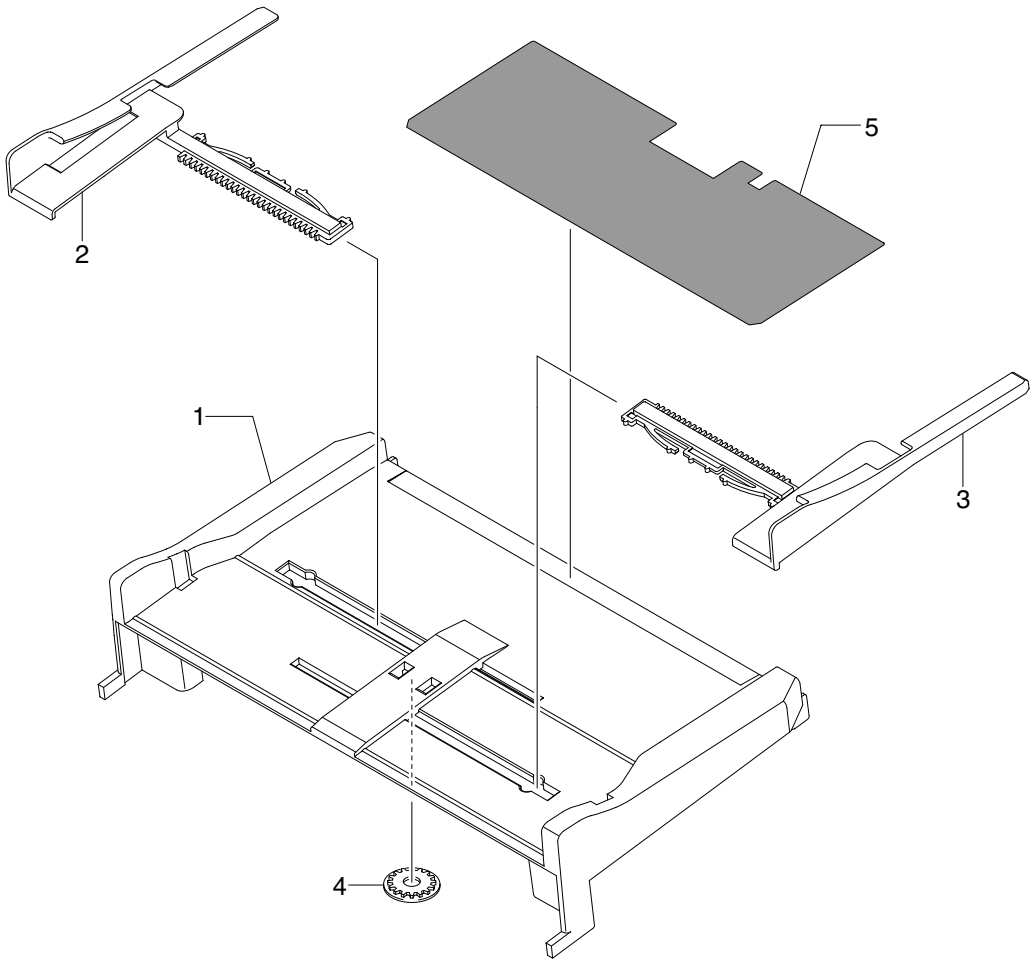
Paper Path Parts List

*SA : SERVICE AVAILABLE, SNA : SERVICE not AVAILABLE
*Grade : Parts Class"A,B,C,D,E"

Drawer#	SEC_CODE	DESCRIPTION	QT'Y	Service	Grade	Remark
5.5-0	JC97-03248A	MEA UNIT-FRAME PAPER PATH	1	SA	B	1640
5.5-0	JC97-03199A	MEA UNIT-FRAME PAPER PATH	1	SA	B	2240
5.5-1	JC61-01161A	GUIDE-M-PAPER PATH	1	SA	A	
5.5-2	JC66-00814A	LEVER-ACTUATOR FEED SENSOR	1	SA	A	
5.5-3	JB61-00107A	SPRING ETC-LEVER SENSOR	1	SA	A	
5.5-4	JC70-10232A	IPR-PLATE SAW	1	SA	D	
5.5-5	JC63-00625A	GROUND-P-VARISTOR	1	SNA	A	
5.5-6	JC63-00624A	GROUND-P-ZENER	1	SA	A	
5.5-7	JC63-00623A	GROUND-P-THV	1	SNA	A	
5.5-8	JC63-00626A	GROUND-P-SAW	1	SNA	A	
5.5-9	JC97-02217A	MEA-UNIT HOLDER PAD	1	SA	A	
5.5-9-1	JC61-70911A	SPRING ETC-EXIT ROLL FD	2	SA	A	
5.5-9-2	JC69-01568A	PAD-FRICTION	1	SNA	B	
5.5-9-3	JC61-01169A	HOLDER-M-PAD	1	SA	A	
5.5-10	JC66-00815A	LEVER-M-KICKER P/U	2	SA	D	
5.5-11	JC97-02179A	MEA UNIT-PICK UP GEAR	1	SA	A	
5.5-11-1	JC66-00803A	GEAR-PICK_UP B	1	SA	A	
5.5-11-2	JC66-00802A	GEAR-PICK_UP A	1	SA	A	
5.5-11-3	6107-001167	SPRING-CS	1	SA	D	
5.5-12	JC33-00028B	SOLENOID-MP	1	SA	A	
5.5-13	JC66-00809A	GEAR-FEED 35/19	1	SA	A	
5.5-14	JC61-00588A	BUSH-M-TR L	1	SA	A	
5.5-15	JC72-00102A	PMO-BUSHING_TR(L)	1	SA	A	
5.5-16	JC61-70940A	SPRING ETC-TR(12)	2	SA	A	
5.5-17	JC66-00725A	ROLLER-TRANSFER	1	SA	A	
5.5-18	JC61-00583A	HOLDER-PTL	1	SA	A	
5.5-19	JC70-00307A	IPR-P-EARTH TRANSFER	1	SA	A	
5.5-20	JC66-00829A	SHAFT-P-PICK_UP	1	SA	B	
5.5-21	JC61-01151A	HOUSING-M-PICK_U	1	SA	A	
5.5-22	JC61-01173A	HOUSING-M-PICK_UP B	1	SA	A	
5.5-23	JC73-00211A	RUBBER-PICK_UP	1	SA	A	
5.5-24	JC66-01935A	CAM-PICKUP L	1	SA	B	
5.5-25	JC66-01936A	CAM-PICKUP R	1	SA	B	
5.5-26	JC66-00813A	GEAR-TRANSFER	1	SA	A	
5.5-27	JC61-01281A	BRACKET-P-BAR_PICK_UP	1	SNA	A	
5.5-28	JC39-00482A	CBF HARNESS-MICRO SW	1	SA	A	
5.5-29	JC61-01548A	HOLDER-M-CAM	1	SNA	A	2240

5.6 MP Tray Assembly (Only ML-2240)



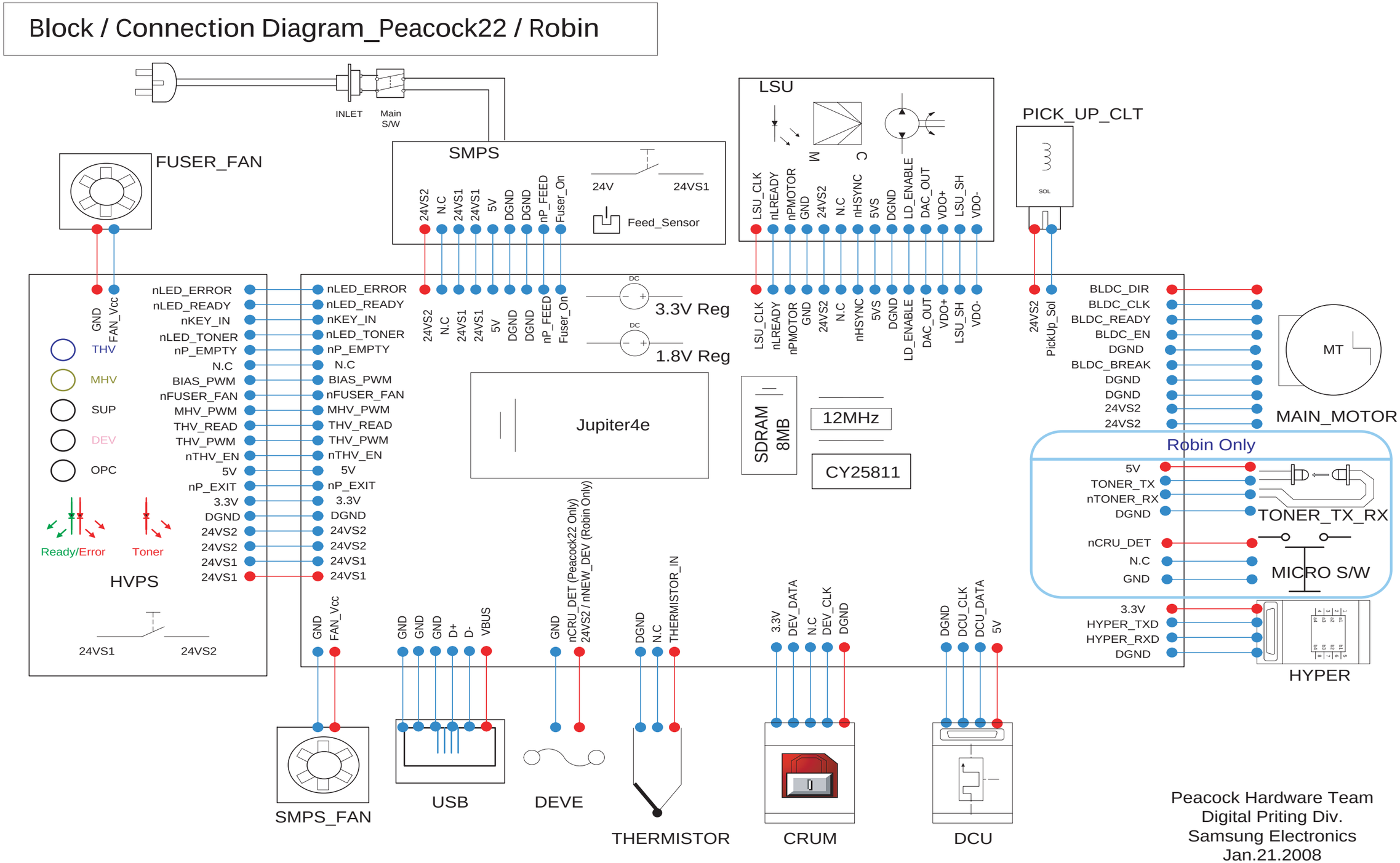


MP Tray Parts List

*SA : SERVICE AVAILABLE, SNA : SERVICE not AVAILABLE
*Grade : Parts Class"A,B,C,D,E"

Drawer#	SEC_CODE	DESCRIPTION	QT'Y	Service	Grade	Remark
5.6-0	JC97-02239G	MEA UNIT-MP TRAY	1	SA	B	
5.6-1	JC61-01263F	PLATE-MP	1	SA	B	
5.6-2	JC70-00514E	ADJUST-MP L	1	SA	B	
5.6-3	JC70-00515E	ADJUST-MP R	1	SA	B	
5.6-4	JG66-40003A	GEAR-PINION	1	SA	B	
5.6-5	JC63-00711A	SHEET-MP	1	SA	B	

6. System Diagram



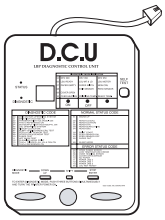
7. Reference Information

This chapter contains the tools list, list of abbreviations used in this manual, and a guide to the location space required when installing the printer. A definition of tests pages and Wireless Network information definition is also included.

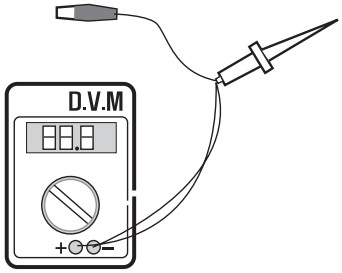
7.1 Tool for Troubleshooting

The following tools are recommended safe and easy troubleshooting as described in this service manual.

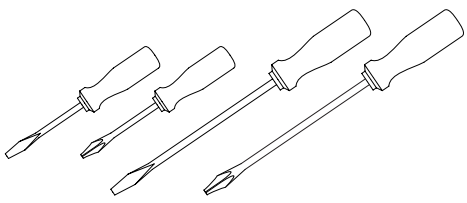
- **DCU (Diagnostic Control Unit)**
  Standard : Test equipment to diagnose the Laser printer supplied by Samsung Electronics.



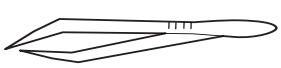
- **DVM (Digital Volt Meter)**
  Standard : Indicates more than 3 digits.



- **Driver**
  Standard : "-" type, "+" type (M3 long, M3 short, M2 long, M2 short).



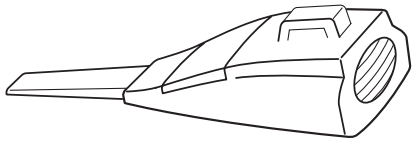
- **Tweezers**
  Standard : For general home use, small type.



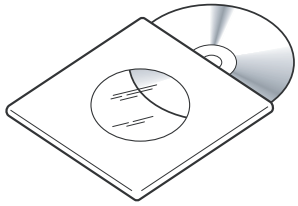
- **Cotton Swab**
  Standard : For general home use, for medical service.

- **Cleaning Equipments**
  Standard : An IPA(Isopropyl Alcohol)dry wipe tissue or a gentle neutral detergent and lint-free cloth.

- **Vacuum Cleaner**



- **Software (Driver) installation CD ROM**



7.2 Acronyms and Abbreviations(1)

The table below explains the abbreviations and acronyms used in this service manual. Where abbreviations or acronyms are used in the text please refer to this table.

Abbreviations	Explanation
AP	Access Point
AC	Alternating Current
APC	Auto Power Control
ASIC	Application Specific Integrated Circuit
ASSY	assembly
BIOS	Basic Input Output System
BLDC	Brush-less Direct Current
CMOS	Complementary Metal Oxide Semiconductor
CN	connector
CON	connector
CPU	Central Processing Unit
dB	decibel
dbA	decibel A
dBM	decibel milliwatt
DC	direct current
DCU	Diagnostic Control Unit
DPI	Dot Per Inch
DRAM	Dynamic Random Access Memory
DVM	Digital Voltmeter
ECP	Enhanced Capability Port
EDC	Embedded Diagnostic control
EEPROM	Electronically Erasable Programmable Read Only Memory
EMI	Electro Magnetic Interference
EP	electrophotographic
EPP	Enhanced Parallel Port
FPOT	First Printout Time
F/W	firmware
GDI	graphics device interface
GND	ground
HBP	Host Based Printing
HDD	Hard Disk Drive
H/H	High temperature and high marshy place
HV	high voltage
HVPS	High Voltage Power Supply
I/F	interface
I/O	Input and Output
IC	integrated circuit
IDE	Intelligent Drive electronics or Imbedded Drive Electronics

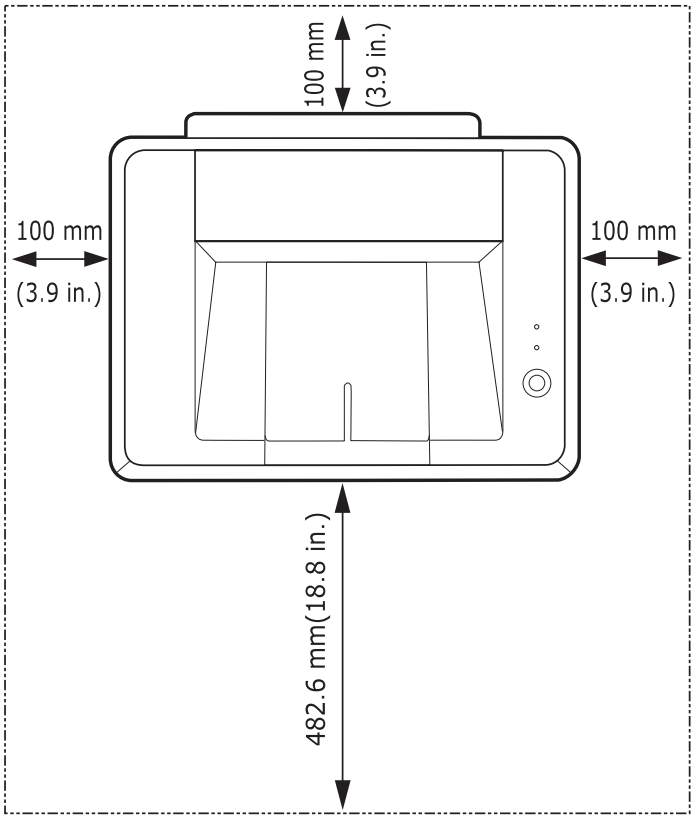
Acronyms and Abbreviations(2)

Abbreviations	Explanation
IEEE	Institute of Electrical and Electronics Engineers. Inc
IPA	Isopropy Alcohol
IPM	Images Per Minute
LAN	local area network
lb	pound(s)
LBP	Laser Beam Printer
LCD	Liquid Crystal Display
LED	Light Emitting Diode
L/L	Low temperature and low marshy place
LSU	Laser Scanning Unit
MB	megabyte
MHz	megahertz
MPF	Multi Purpose Feeder
NIC	Network Interface Card
N/N	Normal temperature and normal marshy place
NVRAM	nonvolatile random access memory
OPC	Organic Photo Conductor
OPE	Operate Panel Equipment
PBA	Printed Board Assembly
PCL	Printer Command Language , Printer Control Language
PDL	Page Discription Language
PPM	Page Per Minute
PPS	Pulse Per Second
PS	Post Script
PTL	Pre-Transfer Lamp
PWM	Pulse Width Modulation
Q-PID	Quick Printer Initiating Device
Q'ty	quantity
RAM	Random Access Memory
ROM	Read Only Memory
SCF	Second Cassette Feeder
SMPS	Switching Mode Power Supply
SPGP	Samsung Printer Graphic Processor
SPL	Samsung Printer Language
Spool	Simultaneous Peripheral Operation Online
SW	switch
sync	synchronous or synchronization
USB	Universal Serial Bus
WECA	Wireless Ethernet Compatibility Alliance

7.3 Selecting printer locations

• Leave enough room to open the printer trays, covers, and allow for proper ventilation. (see diagram below)

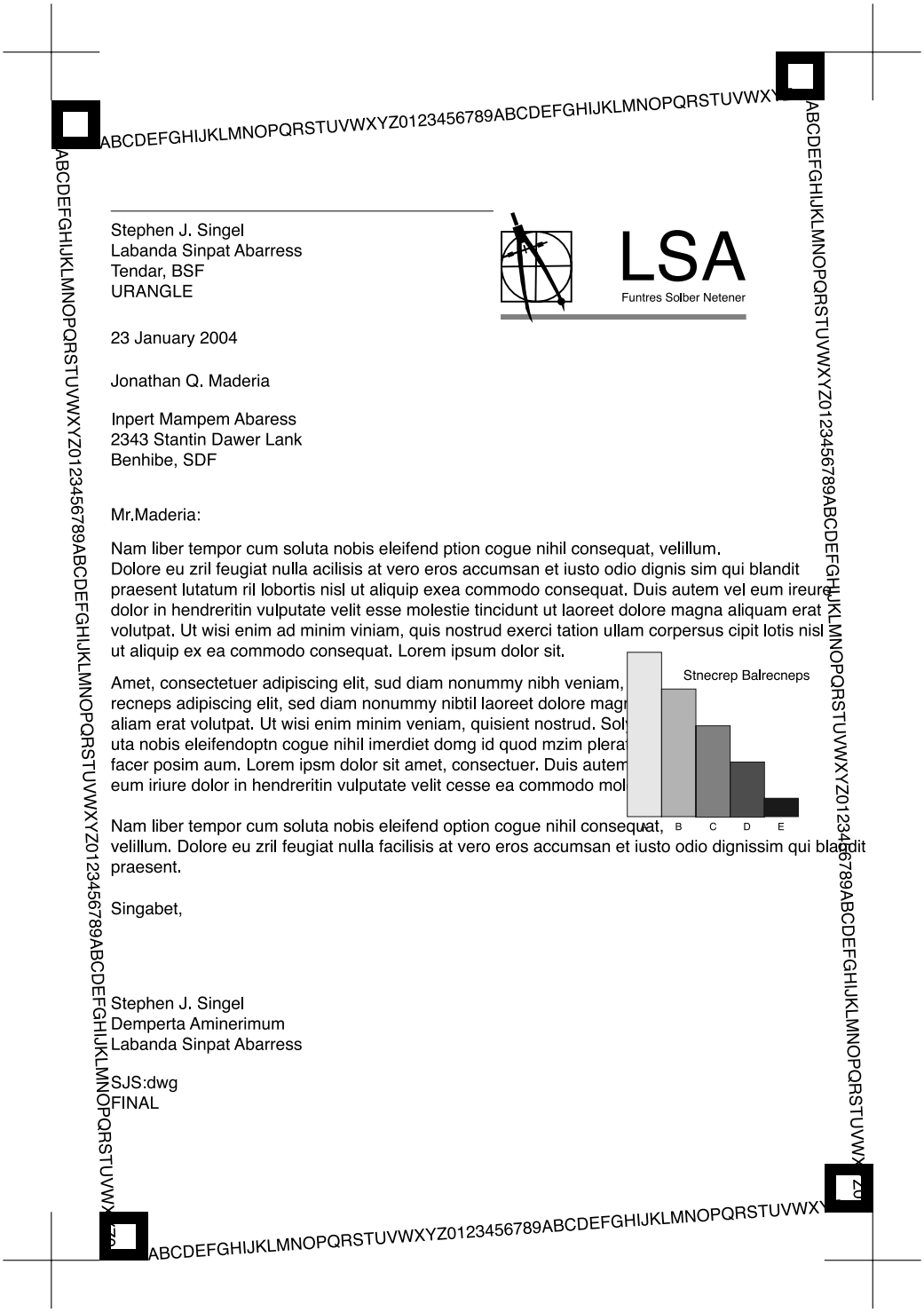
• Provide the proper environment :
- A firm, level surface
- Away from the direct airflow of air conditioners, heaters, or ventilators
- Free of extreme fluctuations of temperature, sunlight, or humidity
- Clean, dry, and free of dust



7.4 Sample Tests Patterns

The sample patterns shown below are the standard test patterns used in the factory.
The life of the toner cartridge, developer cartridge and printing speed are measured with the pattern shown below (5%). The A4 ISO 19752 standard pattern samples are reproduced reduced to 70% of the actual A4 size.

A4 ISO 19752 Standard Patterns


ABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZ
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Tendar, BSF
URANGLE
LSA
Funtres Solber Netener
23 January 2004
Jonathan Q. Maderia
Inpert Mampem Abaress
2343 Stantin Dawer Lank
Benhibe, SDF
Mr.Maderia:
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SJS:dwg
FINAL

7.5 Parts Life Cycle Maintenance Table

7.5.1 Parts Life Cycle Maintenance Table

Supplies	Life Cycle	Condition	Panel LED	Custmoer - Panel Manage	Responding
Toner Cartridge	1.5K: For Product	Toner Low	Toner LED : Red LED blinking	-	10% Remains
	0.7K: For Sale	Toner Uninstall	Online /Error LED : Red	-	
Fuser	50,000(page)	Thermistor Open Error (DCU Code : 60)	On line/Error LED : Red	Replaced at Exhauseted	
		Low Heat Error (DCU Code : 62)	On line/Error LED : Red	Replaced at Exhauseted	
		Over Heat Error (DCU Code : 68)	On line/Error LED : Red	Replaced at Exhauseted	
Transer Roller	50,000(page)	Exhauseted	No Indication	Replaced at Exhauseted	
PickUP Roller	50,000(page)	Exhauseted	No Indication	Replaced at Exhauseted	

7.5.2 Toner Cartridge Criterion

1) Supplies Criterion (Toner Cartridge)

1. Cartridge Main Defects

- White Point, Black Point : White or Black point on printing image
- Image contamination : Dirty printing image
- Image Fainted : Entire Image is fainted and vertical white line emerge

- Black Line : Vertical black line emerge on printing image

2) Defect Symptoms

Symptoms	Criterion	Remarks
White, Black Point	Clean Up OPC (10 times), if disappeared, no failure. - If continuous, failure	System Setup -> Maintenance-> Clean Drum
Image contamination (Toner leakage)	Drity printing image or conteminated reverse side - Clean up OPC (10 times) and inside of machine with cloth, if disappeared, no failure.	
Image Fainted	After shake cartridge right and left 5~6 times, if printing image is not fainted, no failure. (Toner Exhausted)	
Vertical Black Line	Vertical thin line emerge, if cartridge is scratched. - (Customer fault)	

7.6 Model Information

7.6.1 Understanding for Model Code

Model code is inscribed and managed by product standard operation.
If understand the standard operation. It will help to comprehend basic and derived model.

Classification	Model abbriviation				Feature/Properties					
DIGIT	1	2	3	4	5	6	7	8	9	10
Example	M	L		-	1	6	4	0		
Definition	Product Classification		Color Product	Division between code	1. Speed of Engine - If same speed models are released simultaneously higher model is added +1 at speed code. - If over 10 models with same speed are brought into, tenth model is added +1. 2. Domestic Entry Model Distribution - C&C : Engine speed - Information : The first number deleted		1.New model, series model division - Over 3rd grade project 2.Valuablet model division in market despite of not over 3rd grade - VE model, etc. (Valuable model is decided byproduct planning group with sales prospect)	1. Basic : 0 2.Series model division - Below 4th grade project .PC Bundle .Domestic distribution (Entry model excepted)	Main feature description - N : N/W - P : PS - S : N/W+PS - B : Bluetooth - T : 2nd CST - M : Mac Compatible - X : Scanner . Beside abovefeature description, product conception to product planning group responsed	Space (Basic:Omitted)
Code Description	Printer Class of Product Description : M	Laser Beginning letter of printer Description: L	Default = Omissoin. Only color printer "C" initial .Engine = E							
Description	Alphabet			-	Digit				Alphabet	

Classification	Model abbriviation				Feature/Properties					
DIGIT	1	2	3	4	5	6	7	8	9	10
Example	M	L		-	2	2	4	0		
Definition	Product Classification		Color Product	Division between code	1. Speed of Engine - If same speed models are released simultaneously higher model is added +1 at speed code. - If over 10 models with same speed are brought into, tenth model is added +1. 2. Domestic Entry Model Distribution - C&C : Engine speed - Information : The first number deleted		1.New model, series model division - Over 3rd grade project 2.Valuablet model division in market despite of not over 3rd grade - VE model, etc. (Valuable model is decided byproduct planning group with sales prospect)	1. Basic : 0 2.Series model division - Below 4th grade project .PC Bundle .Domestic distribution (Entry model excepted)	Main feature description - N : N/W - P : PS - S : N/W+PS - B : Bluetooth - T : 2nd CST - M : Mac Compatible - X : Scanner . Beside abovefeature description, product conception to product planning group responsed	Space (Basic:Omitted)
Code Description	Printer Class of Product Description : M	Laser Beginning letter of printer Description: L	Default = Omissoin. Only color printer "C" initial .Engine = E							
Description	Alphabet			-	Digit				Alphabet	

7.6.2 Understanding Material Code & Name

Material code and name is maintained by standard criteria.
If understand the criteria, it will help to order materials.

1. Two different description ways for material code. (● : Digit, ■ : Letter(Alphabet))
   - Type 1 ●●●●-●●●●●●● ex) 2007-007961 R-CHIP
   - Type 2 ■■●●-●●●●●■ ex)JB96-01268A ELA UNIT-COVER TOP

   Type 1 : Parts managed by entire divisions : Materials used by all samsung products.
   Most electrical parts are under the type 1.
   Type 2 : Parts managed by a division : Material used by a certain product
   Most mechanical parts are under type 2.

2. A/S Only material : Only for A/S, not related to product manufacturing.

3. Ass'y material : More than two materials are assembled. If the material order is out of service, the order can be processed by Ass'y material order.
   Picture and numbers are also described on Service manual.

※ Ass'y Material and A/S Only material Code are recognizable by product name.
Those are under type 2 and known by material properties and beginning letters of product name.

Classification	Material Code	Material Name
A/S Only Material	**81-******(JB81-00039A)	AS-*****(AS-FUSE)
A/S Only Material	**75-******(JB75-00068A)	MEC-*****(MEC-CHUTE)
A/S Only Material	**92-******(JB92-01131A)	PBA-*****(PBA MAIN-CONTROLLER)
A/S Only Material	**96-******(JB96-01268A)	ELA-*****(ELA UNIT-COVER TOP)
A/S Only Material	**97-******(JB97-01089A)	MEA-*****(MEA UNIT-PULLEY IDLE)

7.6.3 F/W Upgrade Method

※ If F/W needs Upgrade, F/W file and usbprn file are requested.

■ Check "Ready" condition with power ON.

1. Paralle cable case
   - Start Download Rom file with "copy/b b255_706.fls lpt1:" commend on Dos Mode.
   - Once Download are finished, "Reset Printer" is indicated on LCD window.
   - Download finished ▶ Power ON/OFF.

2. USB cable case (Save attached file at certain directory)
   - Start Download Rom file "usbprbs b255_706.fls" on Dos Mode and push the enter key.
   - Once Download are finished, "Reset Printer" is indicated on LCD window.
   - Download finished ▶ Power ON/OFF.